MEMORANDUM

SUBJECT: Portland Cement NESHAP Response to Comments Document

FROM: Joseph P. Wood, P.E. Environmental Engineer
Minerals and Inorganic Chemicals Group
Emission Standards Division

TO: Portland Cement NESHAP Docket

Attached is a summary of all the comments received on the proposal, and the responses to these comments.

Attachment

1. GENERAL

1.1 Comment: One commenter (IV-D-21) supports the proposed rule.

Response: The EPA acknowledges support for the proposed rule.

1.2 Comment: One commenter (IV-D-21) stated that Lafarge and Illinois Cement Company performed a "dry run" implementation of the proposed rule. Illinois EPA, Lafarge, and Illinois Cement Company have communicated any problems that were revealed and any recommended changes to the U.S. EPA.

Response: The EPA acknowledges the support for the proposed rule and communication regarding the “dry run” implementation provided by the commenter noted in the comments above.

1.3 Comment: Several commenters requested that EPA either clarify, revise, or add definitions to the proposed rule. These requests are noted below.

1. One commenter (IV-D-22) stated that the definition of the term "alkali bypass" should be changed to "kiln exhaust gas bypass." This is a more correct term for the equipment. The definition should also be changed from "alkali and sulfur" to "alkali, chloride, or sulfur" as this is a more chemically correct definition.

Response: The EPA agrees with the commenter that the suggested definition changes will clarify and improve the rule. The definition has been changed in the final rule to be more consistent with the New Source Performance Standards (NSPS) definition.

2. One commenter (IV-D-22) stated that the definition of the term "feed" should be changed to delete the words "and become part of the product" in order to keep the definition consistent with that in the NSPS. The NSPS

definition of feed has always included the calcined carbon dioxide in the measured weight of the feed to the kiln. Furthermore, the feed must include the recycled cement kiln dust (CKD) as it is an important part of the feed and affects the emission rate.

Response: The NSPS does not provide a definition of feed as claimed by the commenter. However in defining feed, the EPA did not intend to exclude that portion (weight) of the feed that is comprised of carbonate in the limestone that is converted to carbon dioxide in the process, or portions of the raw materials that end up being captured by the air pollution control devices. The reason for including the wording “and become part of the product” was to point out that fuels are not to be considered as feed materials. The definition of feed in the final rule has been changed to eliminate the phrase “and become part of the product.”

CKD is recycled material (assuming reintroduction to the kiln) whose weight was initially included in the weight of feed when the raw material first entered the kiln. The NSPS did not specifically deal with the question of whether to count the recycled CKD as part of feed in calculating the emission rate to compare to the PM emission limit. However, enforcement practice by the EPA has allowed recycled CKD to be included in the calculation of feed rate. In the final rule, the definition of feed material will be changed to include recycled CKD.

3. One commenter (IV-D-22) stated that in the definition of the term "kiln" the words "subsequent production of portland cement" should be changed to "production of portland cement clinker." The kiln produces clinker not cement. This is more precisely correct and will reduce possible confusion when the MACT rule is implemented.

Response: The definition has not been changed. A kiln is one step in the process which produces portland cement.

4. One commenter (IV-D-22) stated that in the definition of the term "raw mill" the word "raw" should be inserted so that the definition reads "used to grind raw feed." This change will help reduce possible confusion when the MACT rule is implemented.

Response: The EPA disagrees with the commenter, since raw mills may be used to grind feed materials that are not necessarily “raw” materials, e.g., industrial byproducts are sometimes used as feed materials.

5. One commenter (IV-G-3) stated that EPA should better define the points of compliance and monitoring requirements for emissions from "Materials Handling Processes." The generic terms of section 63.1346 are ambiguous with regard to the specific compliance point for opacity measurements as applied to "systems" and "bins." For instance, a conveying "system" may or may not mean a variety of things. This ambiguity may cause disagreement between an implementing agency and the facility. For example, it is not clear if the definition would include front-end loaders or trucks used to convey raw materials or finished products from one location to another within the manufacturing process. If the definition does include vehicles, it is unclear as to the location of a compliance point for measuring opacity. The definition of conveying system should be clarified, particularly with respect to product handling.

Response: “Conveying system” and “conveying system transfer point” are terms that are explicitly defined in §63.1341. The large variation in plant configurations of material handling

processes makes it difficult to define each and every point that is to be covered by the rule, hence the use of general terms. The EPA expects that the appropriate regulatory authority will necessarily have some discretion in designating specific points to which the rule applies within the broader terminology provided by the rule. It is the EPA's intent to include front-end loaders as part of the bulk loading and unloading systems, if they are used to transfer feed or product materials. The point of opacity determination should be at the point of transfer. The applicability section of the rule, §63.1340(c), also provides details regarding the boundaries between the material handling sources covered by the Non-metallic Minerals NSPS and the Portland cement MACT standards.

6. One commenter (IV-D-20) stated that the term "reconstruction" is not listed in the definition section 63.1341 and requested that EPA define the term. The rule could at least reference other regulations where the term is defined, in section 63.2.

Response: The definition of reconstruction is provided in section 63.2 of the General Provisions. The final rule will refer to the section 63.2 for the definition of reconstruction.

7. One commenter (IV-D-13) requested that EPA define the term "THC" in paragraph 63.1345 item (1) to clarify whether "THC" includes volatile organic hazardous air pollutants (HAPs) and non-HAPs (such as methane and ethane).

Response: The proposed rule required in §63.1348(b)(5) that the initial compliance for THC emissions be demonstrated with a continuous emission monitor in accordance with Performance Specification 8A of appendix B to part 60 of 40 CFR. The footnote in the proposed rule referred to the beginning of a section in the Federal Register that included Performance Specification (PS)

8A. The details of CEM equipment specifications are in 61 FR 17497 from April 19, 1996. The details of the proposed amendments to Appendix B for PS 8A require the continuous emission monitor to be a flame ionization detector (FID) analyzer. This requirement equates THC, for the purposes of the Portland cement emission standards, to be the emissions as measured by this device when calibrated and operated according to PS 8A. Therefore, THC will include volatile organic HAPS, methane, ethane, and any other compounds detected by the FID.

8. One commenter (IV-D-20) noted that the industry would likely benefit from a clarification of the term "highest load or capacity level reasonably expected to occur."

Response: The phrase to which the commenter refers appeared in § 63.1348(b)(1)(i) of the proposed rule requiring that EPA Method 5 tests for initial compliance be performed while the affected source is operated under those conditions. For example, if the owner or operator expects that the highest load or capacity level at which they will ever operate a particular kiln is a production rate of 500 tons per day of clinker, then this is the level at which the kiln must be operated during the initial compliance test using EPA Method 5.

1.4 Comment: Two commenters (IV-D-22 and IV-D-32) noted that a typographical error should be changed from "TEO" to "TEQ."

Response: The EPA has made the noted corrections in the final rule.

1.5 Comment: Two commenters (IV-D-24 and IV-D-25) stated that EPA has not met its legal burden to be consistent when regulating similar sources. The EPA/OSW is conducting a rulemaking for kilns that burn hazardous waste (HW) while the EPA/OAQPS is conducting a rulemaking for kilns that burn non-hazardous waste (NHW). In developing these rules, the EPA

has not used consistent rationales to develop emission limitations for the same pollutant and has not used a consistent approach to address any residual risk that may exist after the MACT standard has been implemented. Commenter (IV-D-25) noted that since HW and NHW kilns are identical in both production technology and available control methods, EPA has an obligation to use a consistent approach and a consistent rationale in developing the two sets of standards.

Response: This comment is more appropriate for the rulemaking for hazardous waste burning cement kilns, and these types of questions are answered in more detail in that rulemaking record. There are a number of differences between kilns that burn hazardous waste and those that do not, in terms of process feed/fuel, process operation, pollutants and pollutant quantities generated, the economics of their operations, and the separate statutory and regulatory scheme already existing for hazardous waste combustion units. These differences are the bases for differences in determinations of MACT floors, emission limits, and other regulatory requirements where such differences exist. (It should be noted that the Agency made every effort to develop consistent standards where the facts warrant, e.g., use of a common data base for dioxin/furan standards and use of the cement NSPS as showing long-term achievable limits for PM). When there is no reason for there to be differences between the two standards, EPA has changed the two sets of rules to make them more consistent.

Standards for both HW kilns and NHW kilns are being developed under section 112(d)(2) and these standards are therefore MACT (technology-based) standards, as opposed to being based on residual risk considerations. Residual risks from portland cement kiln emissions will be addressed in accordance with the requirements of section 112(f)(2) within eight years

following promulgation of the MACT standards. However, standards for hazardous waste burning cement kilns must also satisfy the protectiveness requirements of RCRA, so that the Agency examined whether the new MACT standards are sufficiently protective to justify their supplanting national RCRA emission standards. See 61 FR at 17369-71 (April 16, 1996). As a result, under RCRA regulations, HW burning cement kilns are subject to a number of emissions limits and control of a number of HAPs, including mercury and other toxic metals. The NHW cement kilns are not subject to those regulations and therefore do not control as many HAPs. Accordingly, the Agency established fewer MACT floors for NHW cement kilns. Mercury is such an example. Due to existing RCRA regulations, EPA promulgated mercury emission limitations for HW cement kilns; however, there is no mercury MACT floor for NHW cement kilns.

1.6 Comment: Two commenters (IV-D-24 and IV-D-25) stated that, with some noted exceptions, the EPA/OAQPS rule is more consistent (than the proposed hazardous waste combustor [HWC] rule) with the statutory and regulatory provisions of section 112 and previous NESHAP rulemakings and policies adopted by EPA. The EPA/OAQPS approach is more rational, in part, because they are attempting to satisfy the Clean Air Act objectives and not overreach those objectives.

Response: The EPA acknowledges receipt of this comment. As noted in the previous response, EPA does not accept the commenter’s characterization, but the issue is more appropriately addressed as part of the hazardous waste combustion MACT rule.

1.7 Comment: One commenter (IV-D-24) stated that EPA had correctly interpreted section 112(d)(2) in making beyond the MACT floor (BTF) decisions for the proposed rule for NHW kilns but did not correctly interpret the section in making BTF decisions for the proposed HWC rule.

Response: This rulemaking deals only with the NHW kilns. The EPA acknowledges the comment with respect to the proposed rule for NHW kilns and will respond to remaining issues in the HWC rulemaking record.

1.8 Comment: One commenter (IV-D-28) stated that after an initial period, EPA ceased to contact the state and local workgroup members. The state and local members of the workgroup did not receive any information from EPA after November 1996 and did not learn that the proposal was complete until it was announced by EPA. The commenter objects to this situation as EPA has an obligation to continue to interact with workgroup members pursuant to the MACT Partnership model. Since many state and local air agencies have a great deal of experience and expertise dealing with many source categories, involving state and local volunteers (with such knowledge) would only result in a better rule that is easier to implement.

Response: Many informal contacts via telephone calls and e-mails with state and local agency representatives, including the STAPPA/ALAPCO Work Group member, were made (and still are being made) since the last pre-proposal Work Group meeting held in November 1996. Through these contacts information was provided to state and local agency representatives regarding the status of the rule and drafts of the proposal were provided as needed. It should be noted that the rule did not substantively change since the November 1996 meeting. The lengthy Agency and OMB review that began after the November 1996 meeting and lasted until the Administrator’s signature in March 1998 resulted only in preamble language changes.

1.9 Comment: One commenter (IV-D-22) strongly recommended that EPA clarify in the final rule that the HAP surrogates (opacity, particulate matter, and total hydrocarbons) are not in themselves HAPs.

Response: The Section 112(b) List of Pollutants defines the pollutants that are HAPs. Opacity, particulate matter, and total hydrocarbons are not on that list. Particulate matter, opacity, and total hydrocarbons are surrogates for HAPs, however, as explained in the preamble. This is further clarified in the preamble for the final rule.

1.10 Comment: One commenter (IV-D-16) attached as unreferenced support the following documents.

1. Breathtaking, Premature Mortality Due to Particulate Air Pollution in 239 American Cities, Natural Resources Defense Council, May 1996.
2. Database tables, dated May 5, 1998.
3. Air Quality Criteria for Particulate Matter, executive summary, undated.
4. External Review Draft Health Assessment Document for 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds, volume III of III, EPA/600/BP-92-001c, August 1994.
5. Abstract, Winters, D., et al, A Statistical Survey of Dioxin-Like Compounds in United States Beef: A Progress Report, **Chemosphere 32**(3), 369-478, undated.
6. Ferrario, J., et al, A Statistical Survey of Dioxin-Like Compounds in United States Poultry Fat, **Organohalogen Compounds 32**:245-251, undated.
7. Mercury Study Report to Congress, Volume I: Executive Summary, EPA-425/R-97-003, December 1997.

Response: The EPA acknowledges receipt of these attachments to the commenter’s submittal and presumes, although the commenter did not specifically refer to the attachments, that they were intended to support points made by the commenter regarding various aspects of the rule. Those comments are addressed in other sections of this document.

2. APPLICABILITY

2.1 Applicability: General

2.1.1 Comment: The EPA discussed potential extension of its authority under section 129 of the Clean Air Act to portland cement kilns that use greater than 30 percent solid waste materials as alternative fuels. Comments on this issue are listed below.

1. According to one commenter (IV-D-16), the EPA is required to regulate any facility that combusts any solid waste under section 129 of the Clean Air Act. However, EPA's current section 129 regulations either: (1) exempt portland cement kilns that burn any amount of hospital waste, medical waste, and infectious waste from the medical waste incinerator (MWI) rule, (2) exempt cement kilns that burn less than thirty percent waste from the municipal waste combustor (MWC) rule, or (3) have yet to be promulgated as the commercial and industrial waste rule. The commenter asserts that the EPA cannot fail to promulgate section 129 regulations for cement kilns that burn non-hazardous solid waste by suggesting that it may promulgate section 129 regulations in the future. Cement kilns would then be permitted to combust any of these wastes without complying with section 129, despite the fact that the Clean Air Act expressly mandates that any unit burning any solid waste must comply with section 129. Therefore, the commenter asserts that the EPA must promulgate section 129 standards for cement kilns that burn any solid waste now. If EPA cannot promulgate section 129 standards immediately, the commenter asserts that EPA must, at a minimum, include numerical emission standards for the pollutants listed in section

129 (including mercury, cadmium, and lead) in its proposed regulations under section 112.

Response: EPA does not read section 129 as precluding EPA from promulgating an interim section 112 (d) standard for portland cement kilns which burn non-hazardous solid waste. The interim alternative is to have no regulation at all for HAP emissions. This is because the only rules implementing section 129 explicitly do not apply to waste-burning cement kilns (see 40 CFR sections 60.50b(p), 60.32b(m), 60.50c(g) and 60.32e(g)) and the explanation for these provisions in 62 FR at 45117 (Aug. 25, 1997) and 62 FR at 48538 (Sept. 15, 1997)). Neither the commenter or any other person challenged these provisions, and EPA is not reopening the section 129 rules for consideration here.

EPA does not regard interim non-regulation of non-hazardous waste burning cement kilns as a reasonable alternative to including them within the scope of these portland cement MACT regulations. Indeed, were the Agency to exempt waste burning cement kilns from these MACT standards, it would create a strong incentive for cement kilns to burn waste to escape MACT regulation. EPA emphasizes, however, as we did at proposal, that the standards in the promulgated rule do not represent EPA's final determination that only section 112 (d) standards are appropriate or required for solid non-hazardous waste-burning cement kilns. The promulgation does <u>not</u> in any way foreclose an eventual section 129 standard.[1]

With regard to the commenter's suggestion that EPA adopt specific emission limits in this MACT rule for mercury, lead, and cadmium - which are pollutants identified in Section 129 for

[1]Any waste burning cement kiln subject to a section 129 standard would no longer be subject to these section 112 (d) MACT standards. See CAA section 129 (h) (2).

regulation - as EPA discussed at proposal, emission limits were considered in the MACT rule for these pollutants. As discussed at proposal, EPA was unable to identify a MACT floor for mercury. As a result, there is no mercury emission limit which can be associated with a MACT floor. The use of activated carbon injection (ACI) was considered by EPA as a "beyond the floor" alternative. However, as also discussed at proposal, based on the relatively low levels of existing mercury emissions from individual NHW cement kilns and the costs of reducing these emissions by ACI, EPA does not consider this beyond the floor alternative justified. Thus, no mercury emission limit is included in the final MACT rule, and thus would not be included even if this was a section 129 rule. Finally, as also discussed at proposal, EPA considers PM a surrogate for semi-volatile metals (e.g., lead, cadmium, etc.). The proposed rule and the final rule include a PM emission limit based on the use of MACT. As a result, the final rule achieves reductions in emissions of these pollutants consistent with MACT. Furthermore, sufficient data do not exist to identify emission limits for lead and/or cadmium associated with MACT and EPA is unable to establish emission limits for these pollutants in this rule. See Sierra Club v. EPA, no. 97-1686 (D.C. Cir. 1999) slip op. at 15 (EPA is not obliged to establish a MACT standard for HAPs for which the Agency is unable to quantify emission reductions). Even if such emission limits could be developed, however, they would not result in any further reduction in emissions beyond that achieved by the MACT rule, given the PM standard.

Please note that the response to the following comments 2.1.1.2 - 2.1.1.11 are discussed after comment 2.1.1.11.

2. Three commenters (IV-D-23, IV-D-35, and IV-G-3) believe that cement kilns, irrespective of their fuel or raw material mix, should be regulated under the portland

cement NESHAP and not under section 129 of the Clean Air Act.

3. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA's discussion of its alleged authority under section 129 is irrelevant to, and inappropriate in, the proposed portland cement NESHAP. If EPA intends to regulate cement kilns that burn solid waste materials under section 129, the proper venue would be in a reproposal of section 129, not in a proposal pursuant to section 112.
4. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that, based on the discussion of section 129, EPA has apparently already determined how it intends to treat solid waste burning cement kilns in the section 129 rulemaking.
5. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) were concerned that cement kilns could be subject to different regulations from year-to-year (or day-to-day for that matter) depending on whether they trigger the section 129 applicability thresholds. The commenters believe that such a regulatory structure is confusing, burdensome, inappropriate, and raises serious legal issues.
6. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that municipal solid waste is frequently used to reduce emissions. For instance, the combustion of scrap tires in some cement plants has resulted in reductions of nitrogen oxide emissions.
7. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25,

IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) noted that EPA's proposed regulation of solid waste burning cement kilns under section 129 could lead to increase fuel consumption and emissions of greenhouse gases as cement kilns try to avoid triggering section 129 regulation by not burning alternative fuels like solid waste. It therefore would be directly contrary to EPA's policy goals of conserving energy and reducing greenhouse gas and other air pollutant emissions.

8. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that Congress did not intend for section 129 to apply to cement kilns utilizing solid wastes as alternate raw materials or fuels. Congress's intent under sections 129(g)(1)(A)-(C) was to exclude from the definition of solid waste incineration units those facilities that beneficially use solid wastes for recycling purposes, rather than incineration for destruction. The environmentally sound recycling of solid waste (e.g., tires, coke) in cement kilns offers a practical alternative to disposal of these solid wastes while conserving fossil fuels.

9. One commenter (IV-D-35) agrees with EPA that cement kilns would not be expected to simultaneously comply with regulations under section 112 and regulations pursuant to section 129.

10. Seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) agree with the proposal's discussion of the immediate effect of Davis County Solid Waste Management District vs EPA, 101 F.3d 1395 (D.C. Cir 1996). The court vacated the section 129 municipal waste combustor (MWC) standards as they applied to cement kilns, and the portland cement MACT

standards therefore will apply to all kilns that burn anything other than hazardous waste.

11. Seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) disagree with the proposal's contention that Congress intended EPA to issue rules under section 129 for cement kilns that combust materials such as tires and refuse-derived fuel for the following reasons.

    a. The proposed standards under section 112 will be fully protective.

    b. The type of fuel used has a negligible impact on cement kiln emissions. Emissions are overwhelmingly the result of the raw materials used and type of cement manufacturing process used and not the fuel combusted.

    c. The total fuel in a cement kiln comprises only approximately 15 percent of the kiln's charge (the volume of material moved through the process). The waste fuel used to supplement the necessary fossil fuel represents only a fraction of that total fuel.

    d. Unlike MWC that burn municipal solid waste to destroy it but do not engage in manufacturing, cement kilns burn the solid waste as a fuel supplement while both effectively managing the waste and manufacturing a product.

    e. Section 129(a)(1) states that EPA is to regulate "solid waste incineration" units. Section 129 does not include a single reference to cement kilns or any other type of industrial furnace.

    f. Congress explicitly showed in 1984 that it knew that cement kilns were not regarded as incinerators. In RCRA section 3004(q)(2)(C),

Congress crafted a requirement for the special case of a cement kiln located in a city with more than 500,000 people. In that limited situation, Congress said that such a cement kiln would have to comply with regulations "which are applicable to incinerators." Since there is no such language in CAA section 129, the long-standing bifurcation must be retained.

g. Congress intended for EPA to regulate incinerators under section 129 and kilns and other sources of HAPs under section 112(d).

h. Other legal arguments may be found in Exhibit 1 (in docket item IV-D-29), Petitioners' Brief, Davis County Solid Waste Management District vs EPA, September 4, 1996.

i. Additional support for not regulating cement kilns under section 129 comes from EPA. The EPA/Industrial Combustion Coordinated Rulemaking (ICCR)/Process Heater Workgroup recommended "that direct-fired process heaters be addressed through the various source-specific MACT rulemaking proceedings." In a direct-fired process heater, the products of combustion mix with process materials and the combined emissions exit the same stack. Cement kilns that burn materials such as tires or refuse-derived fuel fit this definition. The EPA workgroup made its recommendation since many of the direct-fired sources have their own industry specific MACT requirements, and the emissions from direct-fired process heaters are source- and industry-specific.

j. As shown in Exhibit 3 (in docket item IV-D-29), the Solid Waste Definition Subgroup of the ICCR

concluded that burning for energy recovery should not be covered under section 129, provided the materials have sufficient BTU content and do not contain more than specified amounts of halogens and metals. Such materials are truly fuels and not solid waste.

Response to Section 2.1.1.2 - 2.1.1.11 comments: The EPA acknowledges all the comments dealing with the potential future regulation under section 129 of the CAA of air emissions from cement kilns that burn solid waste (other than hazardous waste). Both the proposed and final promulgated portland cement NESHAP apply to cement kilns which burn solid waste (other than hazardous waste). If the EPA decides in the future that emission standards developed under the authority of section 129 of the CAA are warranted for cement kilns that burn solid waste, a separate rule will be proposed to allow for public comment. The commenters' concerns regarding duplicative regulations are misplaced, however. See CAA section 129(h)(2) (units can't be regulated simultaneously under both sections 129 and 112(d)(2)). With respect to comment 2.1.1.6 above, the EPA acknowledges the comment, but notes that no data were provided to support the commenters' point.

2.1.2 Comment: One commenter (IV-D-20) asked if a kiln particulate matter control device is installed or upgraded in order to meet the proposed particulate matter emission limit, is the kiln then classified as a reconstructed kiln which is subject to other limitations?

Response: The reference to the definition of reconstruction, located in section 63.2 of the General Provisions, has been added to the final rule. That definition, involving process and financial criteria, provides the basis for determination of what constitutes reconstruction. In the example cited by the

commenter, assuming the PM control device is the only thing being installed or upgraded and there is no “reconstruction” of the affected source, the answer is no, the kiln would not be classified as a reconstructed kiln.

2.1.3 Comment: One commenter (IV-D-20) asked if the data were sufficient to cause cement kilns to be added to the list of source categories and subcategories pursuant to 112(c)(6).

Response: The preamble to the proposed rule specifically addressed this question. The EPA added portland cement manufacturing area sources to the final list of categories and subcategories pursuant to section 112(c)(6). The method for identifying and selecting sources for listing and regulation under 112 (d)(2) and (d)(4), and the development of the emission inventory, were discussed at length in these Federal Register notices: 63 FR 17838, 17847-17854 (April 10, 1998); and 62 FR 33627-33630 (June 20, 1997).

2.1.4 Comment: On page 14192, EPA states that "Fugitive sources may emit enough HAP metals to make a plant a major source (when fugitive emissions are combined with all other HAP emissions at the site)." One commenter (IV-D-20) stated that based on the available data, it appears that no cement plants should be defined as major sources according to section 112(a) of the Clean Air Act. This would in effect negate this entire proposed rule. Environmental rules should not be based upon pure speculation such as "Fugitive sources <u>may</u> emit ...".

Response: As discussed in the preamble to the proposed rule, emissions data collected during technical background studies of the portland cement manufacturing industry provided evidence that most, if not all, facilities are major sources of HAPs. Test results showed organic HAP and HCl emissions from some facilities well above the major source threshold [See docket items II-A-20, II-A-40, II-A-41]. Metal HAPs are known to be present in cement

kiln dust, and other pollutants were determined to be emitted in sufficient quantity to exceed the major source threshold. It is important to emphasize that metal HAP emissions from fugitive emission sources are not overlooked in making a major source determination. Further, new and existing cement kilns at area sources are subject to D/F emission limits and other associated requirements; and new greenfield cement kilns and raw material dryers at area sources are subject to THC emission limits and other associated requirements.

2.1.5 Comment: One commenter (IV-D-20) noted that 63.1347(b) states "The compliance date for an owner operator ... that commences new construction or reconstruction after March 24, 1998, is the date of publication of the final rule or immediately upon startup of operations, whichever is later." This is a much shorter compliance period than three years.

Response: Construction of a new facility or reconstruction of an existing facility begun after the proposal date causes the source to be subject to the requirements for new sources, as required by the 1990 Clean Air Act Amendments, section 112(g)(2)(B). In addition, this is a policy interpretation that has been in place for more than 20 years, beginning with the New Source Performance Standards. The EPA believes that a facility owner would not choose to proceed with the installation of air pollution control equipment that will not meet the proposed emission standards, and subsequently have to redesign and upgrade that equipment within the initial compliance period. If an owner can start and complete construction, or reconstruct in less than three years, this will necessarily result in a compliance period of less than three years.

2.1.6 Comment: Two commenters (IV-D-24 and IV-D-25) raised objections to splitting the portland cement category for cement kilns by the type of fuel burned in the kiln. Commenter

(IV-D-24) provided objections in a separate comment on the HWC rule.[2] One commenter (IV-D-25) stated that splitting the industry by fuel type deviates from EPA's original source category list (July 16, 1992 FR), which included only a portland cement manufacturing category, is not supported by the Clean Air Act, and is based on insufficient technical justification. Commenter (IV-D-25) further noted that no distinction is made regarding fuel type under the NSPS, which affects "portland cement plants." The EPA's decision to not use the NSPS categories will result in what Congress hoped to avoid (through section 112(c)(1)) by causing unnecessary costs and dislocations in the cement industry.

Response: Section 112(d)(1) of the Clean Air Act specifically provides that “the Administrator may distinguish among classes, types and sizes of sources within a category or subcategory in establishing standards....”. With regard to having separate categories/subcategories, the Agency believes that there can be significant differences in emissions due to hazardous waste burning that warrant separate classes for these devices. The types of HAPs found in emissions from hazardous waste-burning kilns are different from, and more numerous than, those from NHW kilns. Hazardous wastes can contain virtually any HAP, including substantial amounts of metals, toxic organic compounds, and chlorine, which in turn can be in stack emissions. See the response to comment 5.5.5 for a discussion of the analysis the Agency conducted to conclude that the HAP emissions characteristics between HW and NHW cement kilns are different.

The fact that hazardous waste-burning kilns are dealt with separately under a different statute (RCRA section 3004 (q)(special standards for industrial furnaces which burn

[2]Comments of Holnam, Inc. on U.S. EPA's Proposed Rule: Hazardous Waste Combustors: Revised Standards, August 19, 1996.

hazardous waste fuels)) likewise indicates that hazardous waste-burning cement kilns can be dealt with legitimately as a separate class. Indeed, this existing RCRA regulatory regime has created a different data base, and system of existing controls, which can result in different analyses, different floor controls and standards under the section 112 MACT process, again indicating that these sources can reasonably be classified as a distinct class. Further responses on this general issue are found in the record to the hazardous waste cement kiln MACT rulemaking.

2.1.7 Comment: One commenter (IV-D-25) stated that if EPA does not recombine all cement kilns into one category, EPA should at least ensure that the two rules (for HW and NHW kilns) are finalized on a parallel schedule and that the effective dates of the two rules are the same. By doing so, EPA can minimize some of the uncertainty that the cement industry will encounter in evaluating regulatory costs associated with each rule and making decisions about whether to use hazardous waste derived fuel.

Response: The Agency decided to bifurcate the cement kiln source category into two classes based on whether or not the cement kiln combusts HW. This action is based on the potentially different emission characteristics for some HAPs between the two different classes of cement kilns. See response to comment 2.1.6 for additional detail.

Even though the EPA has considerable discretion in determining the timing of regulations, the Agency has made every effort to coordinate the two sets of rules. There are legitimate reasons for issuing these rules at different times. There is an administration priority (the Combustion Strategy) for hazardous waste combustion units which calls for expedited upgrading of emission standards for such units. There is no such priority for the NHW standards. In addition, EPA has entered into a settlement agreement (in a case to which the hazardous waste-

burning cement industry was a party) calling for a particular schedule for issuing amended standards for these sources and this negotiated schedule (for reasons relating to the litigation settlement) is not identical to the NHW cement kiln schedule. This being said, the Agency has made every effort to coordinate the two sets of rules.

2.1.8 Comment: One commenter (IV-D-25) stated that in the proposed rule for NHW kilns, EPA correctly interpreted section 112(c)(6) by proposing to limit the pollutants to be controlled to just 112(c)(6) pollutants, and not all HAPs, from NHW area sources. In contrast, in the hazardous waste combustion MACT rulemaking, EPA proposed to use 112(c)(6) authority to regulate HW area sources for all relevant HAPs. The commenter believes that the approach taken for NHW kilns is the correct reading of this provision and should be consistently applied in the HW MACT rule.

Response: The EPA wishes to clarify that section 112(c)(6) requires EPA to put categories of sources through the MACT analysis and development process; it does not require that EPA set limits for specific pollutants. Thus, the issue is whether, in developing standards for area sources listed under 112(c)(6), EPA will consider all the HAPs, or only the 112(c)(6) HAPs, emitted by those sources. The EPA noted in a Federal Register notice for the hazardous waste combustion rulemaking that commenters had raised the possibility of interpreting section 112(c)(6) as restricting the Agency to the 112(c)(6) HAPs when developing standards for area sources listed under 112(c)(6). See 62 FR at 24214 (May 2, 1997). The EPA will necessarily interpret the provision in the same way in all final rules where section 112(c)(6) is at issue. See response to comment 2.3.2.

2.2 Applicability: PM/HAP Metals

2.2.1 Comment: According to commenter (IV-D-15), the

proposed NESHAP requirements for PM emissions would impose additional cost without achieving any clear reduction in emissions at sites that already meet the NSPS. The commenter suggested that EPA consider a revision to the proposed NESHAP that would allow facilities that are already subject to the NSPS to avoid the PM standard altogether.

Response: The proposed NESHAP PM emission standard is numerically identical to the NSPS standard for cement kilns and clinker coolers, so the additional cost to which the commenter is referring is not clear. If the commenter is referring to PM testing and monitoring, under the rule performance testing is required initially and then once every five years. This is not an overly burdensome requirement. The supporting statement to Standard Form OMB-83-1, which was submitted to the Office of Management and Budget (ICR #1801.01) prior to proposal, explicitly included the cost of performance testing by Methods 5, 9, and 23 (Table 2 to Part A of the Supporting Statement, Docket item II-F-4). The estimate included the expected burden for performance testing, including a ten percent allowance for unsuccessful tests which would have to be repeated. The ICR and Supporting Statement for the final rule contain identical kiln PM performance test estimates, and 40 CFR 9 is being amended to display the OMB approval.

Periodic testing and monitoring is required to ensure continuous compliance. The monitoring process provides a means to determine when control device performance is deteriorating to levels that will result in increased PM and HAP emissions, and alerts the owner or operator to the need to take corrective actions.

Monitoring equipment costs for COMs required for kilns and clinker coolers not subject to the NSPS, temperature monitors for all kilns, and THC monitors for new greenfield kilns and raw

material dryers have also been included in the SF-83 and Supporting Statement. The cost of PM continuous emission monitors (CEMs) have been included in the estimate of the cost of the promulgated rule, although the compliance date for installation of PM CEMs has been deferred.

2.2.2 Comment: One commenter (IV-D-23) requested that EPA allow the use of an alternative to the suggested emission factor for metal emissions, of one percent of PM emissions, to determine major source status. The commenter also recommended that EPA allow the use of Method 29 for stack emissions, coupled with a representative grab sample/testing regime for fugitive and non-point sources, which are difficult to test.

Response: The EPA does not require the use of the "one percent HAP metals in PM" assumption for determining major source status. Facility owners have alternatives available in that measurement of metals content via stack sampling and analysis of PM samples should be used to derive the needed emission estimates. For further clarification on how an owner or operator should determine if their portland cement facility is a major source, please see discussion of this in the preamble to the final rule.

2.3 Applicability: Dioxin/furan

2.3.1 Comment: One commenter (IV-D-15) asked why EPA would subject all facilities to costly dioxin/furan testing when a significant part of the total dioxin/furan emissions is caused by only a handful of kilns (as suggested by the data in Table 8 that show 5 of 19 kilns with dioxin/furan emissions above 0.2 ng/dscm). Temperature monitoring is all that would be required of most kilns. The EPA should consider revising the proposed rule to require that only specific kilns have dioxin/furan emission limits.

Response: All kilns have the potential to emit dioxin/furan (D/F) in excess of the emission limit with improper combustion and relatively high PM control device temperatures. The EPA is aware of the cost of D/F testing and it was included in the nationwide cost estimates for complying with the rule (see page 3-12 of docket item II-A-46). Please note that to be consistent with the requirements for HW cement kilns, the required frequency of D/F emission testing under the final rule is every 2.5 years, rather than every 5 years, as proposed. Given the toxicity of these constituents (as well as their being singled out in section 112 (c) (6)), the Agency believes that this more frequent testing is appropriate. Emission testing is the only way to determine actual D/F levels and determine compliance. The emission testing is also necessary to establish operating temperature limits.

2.3.2 Comment: Comments on the issue of regulating area sources for pollutants other than those listed under 112 (c) (6), and *de minimis* dioxin/furan emissions are listed below.

1. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) agree with EPA that area sources affected by section 112(c)(6) are obligated to meet emission standards only for the pollutants listed in section 112(c)(6) and not for all 188 pollutants listed in section 112(b). However, the EPA should not exercise its authority under section 112(c)(6) to regulate dioxin/furan emissions from area sources since the area sources have *de minimis* dioxin/furan emissions and regulating them under section 112 will impose significant burdens (for reporting, recordkeeping, monitoring, and control technology) while providing negligible environmental benefits. The commenters do not believe that Congress intended such a result in section 112(c)(6).

Response: The EPA wishes to clarify that section 112(c)(6) requires EPA to put categories of sources through the MACT analysis and development process; it does not require that EPA set limits for specific pollutants. The first issue raised by the commenters is whether, in developing standards for area sources listed under 112(c)(6), EPA will consider all the HAPs, or only the 112(c)(6) HAPs, emitted by those sources. The EPA will consider only the 112(c)(6) pollutants in regulating area sources under this provision. Section 112(c)(6) provides, in part, that "with respect to" these specific pollutants, EPA is to "list categories and subcategories of sources assuring that sources accounting for not less than 90 per centum of the aggregate emissions of each such pollutant are subject to standards." If a source category would not have been listed and made subject to standards but for the requirement to achieve this 90% requirement, that is, the category would not independently meet the generally applicable criteria for listing and regulation, then EPA does not believe that the regulatory development process should expand to cover other pollutants not addressed by section 112(c)(6). See the next comment response for a discussion of the *de minimis* issue.

2. One commenter (IV-G-6) stated that EPA has broad authority to except sources from Clean Air Act (CAA) requirements where the burden of regulation would yield trivial benefits, since "[c]ourts should be reluctant to mandate pointless expenditures of effort." Such categorical exemptions are generally permissible "as an exercise of agency power, inherent in most statutory schemes, to overlook circumstances that in context may be fairly considered *de minimis*. Alabama Power Co. vs Costle, 636 F.2d 323, 360 (D.C. Cir. 1979). For example, the courts have upheld EPA's decision to apply

CAA conformity provisions only to "major" governmental actions, and exclude broad categories of government action, because associated emission increases are *de minimis*. Environmental Defense Fund vs. EPA, 82 F.3d 451, 465-66 (D.C. Cir. 1996). That result seems particularly justified where the statute itself acknowledges *de minimis*-type exemptions by mandating coverage of only 90 percent of dioxin/furan emissions. That opens the door for EPA to exclude area or other "small" sources from MACT coverage here.

On express *de minimis* grounds, EPA recently proposed to establish a broad range of cutoff levels of up to 10 tons per year per HAP for the wood furniture industry. 63 FR 34336 (June 24, 1998). The EPA's core Acid Rain rules similarly authorize broad *de minimis* exemptions from substantive sulfur dioxide allowance mandates, for units less than 25 MW. 58 FR 3590, 3594 (January 11, 1993).

Response: With respect to 2,3,7,8-tetrachlorodibenzofurans and 2,3,7,8-tetrachlorodibenzo-p-dioxin, and five other specific pollutants, section 112(c)(6) requires that EPA “list categories and subcategories of sources assuring that sources accounting for not less than 90 per centum of the aggregate emissions of each such pollutant are subject to standards under subsection (d)(2) or (d)(4) of this section.” The method for identifying and selecting sources for listing and regulation under these subsections was discussed at length in Federal Register notices published on June 20, 1997 (62 FR 33625) and April 10, 1998 (63 FR 17838). Section 112(c)(6) does not provide for de minimis exemptions for source categories, but rather directs EPA to make findings on the basis of what is necessary to meet the requirement to assure that sources accounting for 90% of the

emissions of these pollutants are subject to standards. Moreover, because the pollutants addressed by section 112(c)(6) are persistent, that is, they remain in the environment for extremely long periods of time without breaking down, and are also highly toxic (2,3,7,8-dibenzo-p-dioxin remains the most toxic chemical to humans known), the EPA believes that any claims of de minimis contributions should be considered with great caution, and granted in only very exceptional circumstances. Consequently, EPA believes that its decisions in response to section 112(c)(6) represent a reasonable exercise of its discretion within the constraints of that subsection.

2.3.3 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that area source cement kilns make up only a small fraction of the total dioxin/furan emissions from the entire NHW cement manufacturing source category (that EPA estimates contributes only 0.8 percent to total nationwide dioxin/furan emissions). Therefore, control of dioxin/furan emissions from NHW cement plants will do little to further the Congressional mandate in section 112(c)(6) that EPA assure that sources accounting for not less than 90 percent of the aggregate dioxin/furan emissions are subject to standards under section 112(d)(2) or (d)(4).

Response: Section 112(c)(6) does not provide for de minimis exemptions for source categories, but rather directs EPA to make findings on the basis of what is necessary to meet the requirement to assure that sources accounting for 90% of the emissions of these pollutants were subject to standards. Moreover, because the pollutants addressed by section 112(c)(6) are persistent, that is, they remain in the environment for extremely long periods of time without breaking down, we believe that any claims of de minimis contributions should be considered

with great caution, and granted in only very exceptional circumstances. Consequently, EPA believes that its decisions in response to section 112(c)(6) represent a reasonable exercise of its discretion within the constraints of that subsection.

2.3.4 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA's nationwide inventory of dioxin/furan emissions sources (that has NHW portland cement plants as accounting for 0.8 percent of the total dioxin/furan emitted in the U.S.) does not include large segments of the U.S. dioxin/furan sources due to lack of emissions data. European data for sources omitted from the inventory of dioxin/furan emitting sources show that such sources produce significant levels of dioxin/furans.

Response: The EPA prepared the baseline emission estimates for D/F using the best information available to the Administrator. The EPA considered and included all available information on the emissions of dioxin/furans in its analysis for 112(c)(6). Moreover, in compiling the draft emission inventory for section 112(c)(6) listing purposes, the Agency posted a draft inventory on its Unified Air Toxics Web Site in 1997, soliciting comments and additional information on sources and their emissions. No information or documentation was received on other sources that EPA could incorporate in its analyses. The EPA will continue to update and scrutinize the list to see if other sources should be added due to levels of section 112(c)(6) HAPs in their emissions.

2.3.5 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) believe that section 112(d)(5) grants EPA authority to apply generally available control technology (GACT) standards instead of MACT standards to regulate area sources of section 112(c)(6) pollutants. Section 112(d)(5) does not exclude area source

categories listed pursuant to section 112(c)(6) from the Agency's discretionary authority to apply GACT standards nor does section 112(c)(6) prohibit EPA from exercising its discretionary authority under section 112(d)(5). Section 112(d)(5) apparently grants the Administrator authority to establish GACT standards for any area sources listed pursuant to section 112(c), whether such sources are listed pursuant to section 112(c)(3) or (c)(6). Had Congress intended to exclude section 112(c)(6) area sources from the GACT standards under section 112(d)(5), Congress would have stated this exclusion in section 112(d)(5).

However, one commenter (IV-G-1) suggests that EPA abandon the idea of using GACT to establish standards for area sources listed under section 112(c)(6) and continue to support the MACT to establish these standards for the following reasons.

1. Emission limits are necessary because dioxin/furans and some polycyclic organic matter (POM) bioaccumulate and cause cancer in human beings.
2. Due to the toxicity of dioxin/furans and POM, MACT is needed to establish an emission floor and require a residual risk assessment of the control technology. The GACT approach would not have an emission floor nor a residual risk assessment. Thus, GACT will not offer human health and the environment the most protective control technology.

Response: Section 112(c)(6) specifically states that EPA is to assure that sources of the pollutants to which this subsection applies be subject to standards under subsections (d)(2) or (d)(4). These subsections refer, respectively, to MACT and standards for pollutants for which a health threshold has been established (a null set of purposes for this rule). The natural reading of the provision (and at the least, a permissible one) is to say that MACT standards apply to emissions of 112(c)(6) HAPs

from all sources. The alternative reading, that GACT requirements could apply because GACT requirements apply in lieu of section 112 d (2) MACT requirements reads language into section 112 c (6) not apparent on its face. Moreover, where Congress wished to reference subsection (d) without limitation, it omitted references to specific paragraphs. Compare the language of section 112(c)(6), which refers to standards under subsection (d)(2) or (d)(4), with the language of section 112(k)(3)(B)(ii), which refers to standards under subsection (d). In addition, the reading suggested by the industry commenters goes against the natural purpose of section 112 c (6), namely, to assure that the maximum available control technology is applied to control the emission of the most dangerous HAPs. (This is also the thrust of the comment summarized above criticizing the reading suggested by industry commenters. EPA agrees with this comment.) The Agency has therefore concluded that none of the comments provided compelling facts or arguments to overcome the interpretation that section 112(d)(2) specifically refers to MACT standards.

2.3.6 Comment: Comments on EPA's section 112(c)(6) authority to regulate dioxin/furan emissions are listed below.

1. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) incorporate by reference the American Portland Cement Alliance (APCA) comments on section 112(c)(6) filed in the HWC NESHAP rulemaking.

Response: Comments by the APCA on the HWC NESHAP rulemaking dealing with 112 (c) (6) issues are included within other comments presented here in this document. See comments 2.1.3, 2.1.8, and 2.3.2.

2. Seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) stated that EPA's proposed

action to regulate cement kiln "area sources" under CAA section 112(c)(6) violates the CAA and is arbitrary and capricious. The EPA has “placed the cart before the horse” by proposing to apply the MACT standards to area source cement kilns and other HWCs before even deciding upon listing criteria and preparing the overall list or lists of sources required by that provision. Exhibit 4 in docket item IV-D-29 expounds the commenters' point.

Response: This comment, that was incorporated in APCA’s submittal, was prepared prior to the Notice of final source category listing for section 112(d)(2) rulemaking pursuant section 112(c)(6) requirements in 63 FR 17838-17855, April 10, 1998. The referenced notice provides the listing of area sources.

3. Seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) favor another interpretation of section 112(c)(6). The only section 112(c)(6) pollutants that should be regulated are those specifically responsible for EPA's decision to list the source category under section 112(c)(6). Pages 50-53 of Exhibit 5 in docket item IV-D-29 expound the commenter's point.

Response: The proposed rules for NHW portland cement manufacturing would only regulate D/F emissions which are one of the pollutants for which these plants are listed as area sources. See the notice referenced in the previous comment response. The pollutants for which portland cement NHW kilns were listed under 112(c)(6) are POM, D/F, and mercury. At proposal, the EPA had conducted an analysis under section 112(d)(2) for D/F and mercury with respect to establishing emission standards, and concluded that area sources of D/F should be regulated. The analysis for mercury showed that the MACT floor for new and existing sources

was no control. The BTF technology, use of activated carbon injection, was determined not to be cost-effective. Therefore, no emission standard was proposed for mercury.

The preamble for the proposed rule stated that POM emissions (using THC as a surrogate) from portland cement NHW kiln area sources would be subject to MACT standards under EPA's interpretation of section 112(c)(6). At proposal, THC was identified as a surrogate for organic HAP emissions, which include POM. However, the THC emission limit in the proposed rule for new raw material dryers and new NHW in-line kiln/raw mills would apply to only major sources. For the final rule, EPA is clarifying that since THC is a surrogate for POM, and POM is a listed HAP under 112(c)(6), the THC emission limits are applicable to *area* sources as well as major sources. For further clarification, the final rule's limits on THC emissions are applicable only to *greenfield* kilns and dryers, for reasons discussed later in this document dealing with comments on the THC limit.

2.4 Applicability: THC/Organic HAPs & Determining Major Source Status

2.4.1 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) request that EPA allow cement manufacturers the option of using Method 25 (in addition to Method 18 or Method 320) for the purpose of determining whether a site is a major source of organic HAPs. The commenters suggest that the relatively inexpensive Method 25 could be used by cement plants that have low concentrations of organic matter in the raw material mix to verify that the plant's THC emissions are less than 10 tons/year. A plant with an annual THC emission rate of less than 10 tons would not exceed the major source statutory criteria for organic HAP emissions (e.g., greater than 10 tons/year of a single

organic HAP or an aggregate organic HAP emission rate in excess of 25 tons/year). This efficient approach should not be precluded in the final rule.

Response: The focus of the commenters' point is alternatives to measurement of organic HAP in the process of making a major source determination. However, all HAP (organic, HCl, metals, etc.) must be included in that determination, so it is necessary to obtain data that will allow summation of all HAP emissions to compare to the 10/25 ton per year thresholds. Depending on site-specific circumstances, EPA Method 25 may not provide sufficient information to make an accurate summation. Method 25 reports emissions of hydrocarbons on the basis of concentration of carbon in the stack gas. Given that the method provides no compound-specific data, it is not possible to make an accurate determination of organic HAP emissions. However, the owner or operator may choose to interpret Method 25 results as being equivalent to organic HAP emissions. For further clarification and details on how an owner or operator can determine if its facility is a major source, the EPA has included a discussion of this issue in the preamble of the final rule.

2.5 Applicability: HCl & Determining Major Source Status

2.5 Comment: The EPA proposed that Method 26 may only be used to measure HCl if source operators validate the method on a kiln-by-kiln basis using proposed Methods 321 and 322, since EPA believes that HCl emissions measured with Method 26 are understated by a factor of up to 30 (per docket item II-I-121). The following comments were received on this issue. Response to all 2.5 comments follows comment 2.5.11 below.

1. Eleven commenters (IV-D-18, IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that this restriction should be deleted

from the proposed rule since it is not based on good science for the reasons given below.

a. The EPA did not consider the significant temperature disparity and sampling system differences between Method 26 (conducted at approximately 250°F) and Methods 321 and 322 (conducted at approximately 350°F). Section 2.4 of attachment number 2 of 4 to docket item II-I-191 states that: "It would seem obvious ... that a significant portion of HCl is lost in the relatively cool sample collection system." Considering the reactivity of HCl, it would seem that elevating the temperature would likely reduce this scrubbing effect in the front half of the train. Also, glass filters were used in the study instead of the Teflon filters specified by the method.

b. The EPA did not have sufficient data (with only three test runs) to statistically prove that Method 26 is biased low for all cement kilns.

c. The EPA did not consider that all of the testing conducted using gas filter correlation infrared (GFCIR) spectroscopy testing was biased high relative to the results expected from analyte spiking used to validate the method. This is not mentioned in the preamble. Furthermore, one Method 301 validation test (see Attachment F to docket item IV-D-26) that used an FTIR instrument for HCl measurements gave results that were biased up to 30 percent high relative to the results expected from the analyte spiking.

2. The EPA based its decision (to require validation of Method 26 testing) on a paper presented at an Air and

Waste Management Association meeting. Commenter (IV-D-18) provided the test report which is the basis of the paper. [Note: A later-dated revision of the report is in the docket as attachment number 2 of 4 to item II-I-191.]

3. Eleven commenters (IV-D-18, IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA should conduct controlled testing using Methods 26, 321, and 322, at comparable sampling system and filter temperatures, before imposing any restrictions on using these HCl emissions test methods. Until such testing is conducted, EPA should allow the use of either instrumental test Methods 321, 322, or 26 (conducted at elevated temperatures or approximately at the stack temperature) to determine major source status for HCl.

4. Eleven commenters (IV-D-18, IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA should provide industry the choice of conducting testing for HCl with either Method 26, 321, or 322 since:

   a. According to eleven commenters (IV-D-18, IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6), the Wool Fiberglass Manufacturing NESHAP provided industry the choice of using either Method 316 (an impinger-based formaldehyde test method that can bias results either low or high, similar to Method 26) or Method 318 (an FTIR instrument method).

   b. According to one commenter (IV-D-18), in March 1994, EPA/EMC was asked to make a determination of the validity of existing HCl test methods for all source categories, but in particular for cement

manufacturing and secondary aluminum (docket item II-B-45). The industry should not be required to bear the cost of EMC's failure to perform the evaluation by having to conduct kiln-by-kiln validation of Method 26.

c. According to one commenter (IV-D-18), the proposed Pulp and Paper Production NESHAP (see 63 FR 18769, April 15, 1998) would not regulate HCl emissions (that are comparable in volume and concentration to those emitted from cement kilns), pursuant to section 112(d)(4). If HCl emissions at these levels do not pose a threat to human health or the environment, then surely exact measurement of them is not required.

5. One commenter (IV-D-20) stated that based on the numerous tests they have conducted with Method 26,[3] they believe that it gives false positives in that the so-called hydrogen chloride results are really ammonium and potassium chlorides rather than hydrogen chlorides. Eleven commenters (IV-D-18, IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) concur.

6. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that portland cement manufacturers electing to use either Method 26 or Method 26A should not be required to also conduct Method 321 or Method 322 and a Method 301 validation for the following reasons.

a. Method 26 has long been an approved EPA test

[3]Cement Kilns-Sources of Chlorides Not HCl Emissions," Michael Von Seebach and David Gossman, Air and Waste Management Association International Specialty Conference for Waste Combustion in Boilers and Industrial Furnaces, April 1990.

method.

b. Method 26 is and has been an appropriate method to use for determining emission factors at portland cement plants.

c. The EPA cannot couple the utilization of Method 26 or 26A with other methods without first proposing and then subsequently finalizing changes to the method. (See e.g., National Lime Association vs. EPA, 627 F.2d 416 (D.C. Cir 1980); Portland Cement Association vs. Ruckleshaus, 486 F.2d 375, 396-400 (D.C. Cir. 1973), cert. den, 417 U.S. 921 (1974)). Such official changes to Method 26 or 26A have not been undertaken.

d. There is no reason for the cement industry to conduct Method 301 validation at each plant that elects to use Method 26 or 26A. Method 301 was expressly meant to validate only new or alternative test methods, not to be applied to established methods.

7. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) request that Method 26 or 26A validations (using Method 301) be conducted at only three plants, representing the three predominant cement processing types: wet, long dry, and preheater/precalciner. The results of these three validations could then be used by other plants electing to use Method 26 or 26A for purposes of determining the concentration of HCl in stack gases.

8. One commenter (IV-D-28) stated that it seems rather pointless to require testing for HCl (in section 63.1350) when EPA has determined that no emission limit should be required. If EPA does not establish HCl emission limits, the commenter recommends that EPA

clarify:

a. the purpose of the testing

b. what testing is to be ongoing

c. what testing should be performed only once.

9. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated in their Attachment E that EPA's claim that Method 26 (or Method 26A) is biased by a factor of 25 should have been noticed by others prior to the reference (docket item II-I-121) cited by EPA. The testing reported in docket item II-I-121 did not conform entirely to Method 26 or Method 26A. Regardless of the adequacy of the tests reported in docket item II-I-121, EPA should not accept a claim that a long standing reference method procedure is biased by a factor of 25 without confirming data.

10. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated in Attachment E (to docket item IV-D-26) that there is no clear relationship between HCl emissions and sampling temperature. More information concerning all of the HCl emission test methods is needed to determine if any or all of the methods are subject to either positive or negative biases. Questions concerning the adequacy of HCl emission testing provide another reason for not regulating HCl emissions at this time.

11. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) remarked that statements regarding bias between Method 26 and proposed Method 322 should be removed from the proposal and replaced with statements on the importance of sampling system and filter temperatures when

conducting emission measurements for HCl.

Response to all Section 2.5 comments: The commenters raise a number of issues with regard to measurement of HCl emissions, and the test methods to be used in determining major source status. As a result of further work by the Agency, and in response to concerns expressed by the commenters, the EPA is modifying its position in promulgating the final rule. The response is organized to first present the rationale for needing accurate HCl emissions data as questioned by some commenters. Second, a discussion of the points raised regarding the applicability, biases, and validity of Methods 26 is presented. Third is a discussion of the allowable methods for HCl measurement.

Two commenters did not understand the purpose or need for accurate measurement of HCl since no HCl emission limit is being established in this rulemaking. HCl is a listed HAP and cement kilns are known to emit significant amounts of HCl. The reason that accurate measurements are needed even though affected sources are not subject to an HCl emission standard is that the data are required to determine if a facility is a major source of HAPs. The only exception would be an owner or operator who is willing to concede that the facility is a major source of HAPs without such information.

As described in the preamble to the proposed rule, the EPA obtained information from comparative studies that showed a negative bias in the Method 26 measurements. One potential explanation is that the bias may be attributable to the probe and filter box temperature being maintained at 250^{o}F in the Method 26 sampling train allowing condensation or scrubbing of HCl from the sample gas stream upsteam of the HCl collecting portion of the sampling train. See Docket Item IV-D-39. The EPA also recognizes that Method 26 may have positive biases as reported by

some commenters. As noted by the commenters above, the method may produce false positives attributable to chloride salts rather than to HCl. Therefore, the Agency has decided that Method 26 and 26A use without concurrent validation with M. 321 will only be acceptable for measuring HCl from NHW kilns to confirm that the portland cement plant is a major source. M. 26 or 26A may not be used by itself to measure HCl to make the determination that the source is an area source. Only the FTIR methods may be used in the measurement of HCl if the source claims it is not a major source.

After further review and consideration of infrared spectroscopy Methods 320, 321, and 322 that were proposed simultaneously with the portland cement NESHAP, the EPA has decided to promulgate only the FTIR-based methods (320 and 321). Only Method 320 and 321 results for HCl will be acceptable for measuring HCl from NHW kilns in determinations that the source is an area source. The GFCIR Method (322) is not being promulgated at this time due to problems encountered with the method during emissions testing at lime and cement manufacturing plants. See docket item IV-B-12.

Companies have the option of identifying a manufacturing site as a major source without conducting testing. However, companies that claim that specific sites are area sources must conduct accurate stack emissions testing to support their claim. See the final preamble for a detailed discussion of determining major source status.

3. SELECTION OF POLLUTANTS

3.1 Selection of Pollutants: PM/HAP Metals

3.1.1 Comment: Method 29, which is typically used to measure the concentration of HAP metals in stack gas samples, does not provide information on the speciation of the HAP metals.

For example, chromium and nickel may be present in different chemical forms. Some of the chemical forms or species are not toxic. One commenter (IV-D-18) stated that EPA should revise its estimated fraction of HAP metals contained in PM to exclude the non-toxic forms of these metals.

Response: Section 112(b)(1) lists chromium compounds and nickel compounds as hazardous air pollutants. The list does not distinguish among the various possible compounds of these metals to identify only those that are toxic. The quantity of HAP metal content does not affect the decision to have an emission standard for PM. HAP metals are present and have been measured in kiln exhaust PM and CKD, therefore an emission standard has been established on the basis of the MACT floor technology.

4. IMPACTS

Preface: Changes were made to the rule as the result of comments we received on the proposal. Based on these changes, and comments we received that certain impacts were not considered at proposal, cost and other related impacts have been updated for the final rulemaking. The major changes in the rule which have most affected the impacts estimates are the requirement for PM CEMs and additional monitoring of materials handling facilities. (Although the required date for the installation of PM CEMs is deferred until a future rulemaking, costs were considered in this final rulemaking.) As a result of these additional costs, two additional small business impacts analyses have been conducted (docket items IV-B-1 and IV-B-11), the economic impacts have been reanalyzed (denoted as Appendix G of the original EIA, docket item IV-A-4), and the national cost impacts have been updated (docket items IV-B-8 and IB-B-9). The following are the comments and responses for the impacts as described at proposal, with reference to the updated analyses, where applicable.

4.1 Impacts: General

4.1.1 Comment: One commenter (IV-D-15) stated that the proposed regulation is not an "economic level playing field" as stated by EPA because it punishes the best performing plants with the bad.

Response: The EPA acknowledges that even the best performing plants (many already complying with the NSPS) will incur some costs for initial compliance testing and reduction of D/F emissions, and will incur some additional costs to collect and maintain monitoring data showing continuing compliance in the period between compliance tests. The reference to a level playing field means that the EPA does not require the best performing plants to do more than all other plants, but other

plants must come up to that level. In general, the EPA expects that the best performing plants will have to spend relatively less to achieve compliance and remain in compliance than those that currently do not perform as well. (See docket item II-A-46).

4.1.2 Comment: Commenter (IV-D-18) stated that the benefits to the environment in terms of (1) reduced metal HAPs and (2) exact measurement of HCl emissions has not been demonstrated for the cement plant NESHAP. By contrast, the burdens to the industry from these two aspects of the rule are obvious and significant. Therefore, the Agency should delete from the cement manufacturing NESHAP both: (1) the proposed PM standard and associated monitoring requirements, and (2) validation of Method 26 for purposes of determining major source status.

Response: Title III of the Clean Air Act Amendments includes no requirement to balance benefits against the requirement for technology-based emission standards when a MACT floor technology exists, and in fact, forbids such analysis. Metal HAPs are present in kiln exhaust PM, and the MACT floor technology removes metal HAPs from the exhaust gas while collecting PM. Metals emissions reductions were presented in the proposal preamble.

HCl is a listed HAP and therefore must be included when determining a facility’s major source status. The need for an accurate measurement of HCl is dictated by the quantitative test for determination of major source status, i.e., more than 10 tons per year of one HAP, or 25 tons per year of a combination of HAPs. Furthermore, accurate measurements of HCl are important because, in some cases, HCl is the main HAP making portland cement plants major sources. The EPA has reconsidered the requirement to “validate” measurements performed by EPA Method 26. As discussed in the response to comment 2.5 in

section 2. of this document, only Method 320 and 321 results will be acceptable for measuring HCl from NHW kilns if the source claims it is an area source. Sources may use Method 26 or 26A without concurrent use of the FTIR methods only to confirm they are major sources.

4.1.3 Comment: One commenter (IV-D-23) stated that the portland cement NESHAP could have far-reaching economic and operational impacts on the portland cement manufacturers, their workers, the communities which depend on portland cement manufacturing for their livelihood, and the construction industry which relies on portland cement as a cost-effective and necessary construction material. The commenter expects EPA to make its decision regarding the rule based on sound technical decisions that are consistent with the Clean Air Act statutes.

Response: The proposed and promulgated emission standards for this source category are based on the MACT floor technology identified for each of the affected sources. As described in the proposal preamble, and supported by various docket documents, the MACT floor technologies are in wide use within the industry and the floors have been determined in accordance with the Clean Air Act requirements. The Agency has prepared an economic impact analysis to address the “far-reaching economic and operational impacts” of this proposed NESHAP. The economic approach was developed to provide EPA with these impacts as they are an important input to the regulatory development process. To support this rule, the economic analysis provides estimates of changes in market prices, domestic production, foreign trade and the corresponding impacts on the manufacturing plants in terms of changes in revenues, costs, and profits, as well as closures and job losses. In addition, the estimated increase in market prices indicates the share of the regulatory burden to be passed on to the construction industry, the major consumer of portland cement.

4.1.4 Comment: One commenter (IV-D-25) stated that EPA should have ensured that the information presented in the regulatory impact analysis for the proposed rules for NHW and HW cement kilns was presented to allow the reader to compare the results. By not doing so, EPA has not complied with the Administrative Procedures Act.

Response: Economic impacts for both rules were analyzed and reported in each respective rule proposal. (A regulatory impacts analysis was not prepared for the proposal [for NHW kilns] because annual costs were not projected to exceed $100 million.) Details of each were also included in docket items. The Agency was unable to provide comparative results for these rules because this NESHAP and the HWC MACT standards were developed separately and the proposed HWC MACT standards are currently being revised by the Agency. Therefore, comparable economic impact results were not available to the Agency at the time of proposal. However, in an attempt to provide comparable impact results, the Agency has recently employed the economic model used in support of the proposed NESHAP to estimate the economic impacts of the revised HWC MACT standards. The economic approach was appropriately augmented by the Agency to account for the hazardous waste burning decision at cement kilns and the markets in which they compete with other suppliers of these HW incineration services, e.g., commercial incinerators and lightweight aggregate kilns (LWAKs). This economic model was also employed by the Agency to analyze the economic impacts of the upcoming RCRA rule related to Cement Kiln Dust (CKD). Further, the revised EIA conducted after proposal (docket item IV-A-4) was coordinated with the HWC MACT standards' final rulemaking EIA to use the same baseline year, PM CEM cost inputs (where applicable), etc.

4.1.5 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24,

IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) believe that a Regulatory Flexibility Analysis is necessary to identify more cost-effective alternatives to gas cooling for D/F reductions, and the permitting, monitoring, and reporting requirements for small portland cement companies.

Response: Two D/F control techniques were considered in the development of the standard: the MACT floor technology of temperature control (achieved with water injection) and the beyond-the-floor control technology of activated carbon injection. Water injection was the more cost-effective control technology. Permitting, monitoring, and reporting costs were included in the Supporting Statement to Standard Form OMB-83-1 (see docket item II-F-4).

The EPA concluded that a regulatory flexibility analysis, pursuant to the requirements of sections 603 and 604 of the RFA, was not required for this rulemaking. [See the response to comment 4.2.1]. Nonetheless, the Agency conducted a small business assessment and reported the impacts of each proposed regulatory alternative on small businesses (See EIA final report, Table 4-7, docket item II-A-46). The measures of impact included the regulatory control costs, change in pre-tax earnings, kiln closures, employment loss, and the cost-to-sales ratios. See also the additional small business impacts analyses conducted since proposal (Docket items IV-B-1 and IV-B-11).

4.1.6 Comment: Commenter (IV-D-27) stated that the proposed rule does not contain measures that prevent pollution or reduce energy requirements and urges EPA to look to progressive companies like Holnam for ideas on preventing pollution and improving energy efficiency in portland cement manufacturing. For instance, the Holnam plant in LaPorte, Colorado has spent more than $19 million in process improvements and environmental upgrades, reduced coal consumption by 60,000 tons, and reduced

their cement kiln dust by 42,400 tons through the following projects.

1. increasing the length of the calciner and installing a Hamon heat exchanger (to reduce organic compound emissions)
2. using the dust collected from the calciner as media for the dry scrubber (that controls sulfur dioxide emissions from the kiln)
3. changing to an enclosed raw feed belt conveyor
4. modifying the position of the kiln feed shelf (to provide more efficient loading and decrease potential for build up at the kiln inlet)
5. upgrading the process computer control system [Note: This includes monitoring the opacity in on-line baghouse compartments (while one compartment is taken offline for cleaning) to identify bag leaks. Two employees are dedicated to inspecting and maintaining baghouses.]
6. reducing fugitive emissions from roads and truck load-out areas and CKD storage.

Response: The proposed NESHAP is written in terms of emissions standards based on MACT floor technologies, but does not prevent facilities from using pollution prevention techniques to achieve compliance. The EPA applauds the plant's efforts at preventing, controlling, and monitoring its air emissions.

The commenter's reference to increasing the calciner's length and installing a heat exchanger was referring to a plant with a unique design and using feed material with relatively high organic content. These are improvements that are not necessarily applicable and economical for other plants to achieve hydrocarbon emission reductions and conserve energy.

The EPA considered pollution prevention options available

[Docket Item II-B-38] and the basis for the standard for THC for new greenfield sites, feed material selection, is a pollution prevention measure. In addition, the final standard includes a monitoring requirement for inspection of the combustion system components of kilns and in-line kiln raw mills (an energy efficiency and pollution prevention measure) and standards for PM from product handling affected sources. Furthermore, the final standard clarifies that recovered cement kiln dust can be included in the calculation of kiln feed (encouraging recycling and pollution prevention).

The EPA considered a precalciner/no preheater system, comparable to that mentioned by the commenter in the first point, as a possible beyond-the-floor technology for existing kilns and as a possible MACT floor for new kilns (docket item II-B-47, docket item II-B-48). However, relative to the preheater/precalciner designs, it was found to increase fuel consumption and emissions of sulfur dioxide, nitrogen oxides, and carbon dioxide (docket item II-B-48, docket item II-D-199). Although the technology does reduce hydrocarbon emissions, the negative impacts (higher fuel consumption and increased criteria pollutant emissions) make it an unacceptable BTF option.

Dry scrubbing with CKD is not a MACT floor control option and was not considered as a BTF option for kiln exhaust gas because no information and data on the scrubber nor its effectiveness of HCl or other pollutant removal were available to the Administrator, nor were any provided by the commenter. Its use to reduce sulfur dioxide emissions from the kiln, while environmentally beneficial, is not relevant to development of the NESHAP unless performance data show it to be effective in removing HAPs as well.

The steps taken to reduce fugitive dust emissions (points 3 and 6) are control options for materials handling operations that are consistent with achieving compliance with the opacity limit. The steps identified by the commenter may be appropriate for many plants to achieve compliance with the 10 percent opacity limit for conveying systems and bulk loading and unloading systems. The described use of opacity monitors in on-line baghouse

compartments to detect leaks may be an acceptable alternative for baghouses applied to raw and finish mills. Plants may petition the Administrator for approval of the use of bag leak detectors as an alternative monitoring requirement. Although not required, such bag leak detection systems in baghouses applied to kiln and clinker cooler exhaust gas streams would be an additional tool for ensuring that acceptable performance is maintained.

The reference to modifying the position of the feed shelf in point 4 is consistent with good process operation and presumably would reduce the potential for fugitive emissions, thus aiding achievement of compliance with the opacity limit for materials handling operations. The EPA has no data on HAP emission reductions and costs associated with this modification.

4.1.7 Comment: According to one commenter (IV-D-27), section IV.E notes that an increase in energy [use] may result from implementing the proposed rule. The commenter believes there are numerous opportunities to improve energy efficiency in the portland cement industry (as mentioned in comment 4.1.6). Section IV.E would be a good place to provide a discussion of these opportunities.

Response: The increase in energy consumption associated with implementation of the proposed rule is estimated to result from the addition of electrical fields to existing electrostatic precipitators and water injection for additional cooling of the kiln waste gas streams for D/F control. The improvements in energy efficiency referenced by the commenter are associated with upgrading a wet-type kiln to a unique design with a precalciner and no preheater upstream of the kiln. This design is more energy efficient than a wet kiln, but, this design is 79 percent less fuel efficient relative to the modern preheater/precalciner designs (docket item II-D-199). The change in design that yielded improvement in energy efficiency at that plant is not expected to be broadly applicable across the industry. In

general, significant improvements have been achieved in energy efficiency through replacement of the older wet and dry process cement kilns by the new preheater/precalciner designs. The economic factors (including energy efficiency) affecting replacement of an existing wet or dry process kiln by a new preheater/precalciner kiln must be evaluated by the facility owner.

4.1.8 Comment: One commenter (IV-D-27) noted that there is only a brief discussion of the effects of dioxins/furans and HAP metals in section IV.F. They request a more detailed discussion or reference to other information and believe there should be a specific discussion on mercury and hydrogen chloride.

Response: A discussion of the health effects of HAPs emitted from portland cement kilns appeared in section II(C) of the proposal preamble. This section included descriptions of effects of hydrogen chloride and HAP metals (including mercury) as a group. This information is intended to assist the lay public in understanding why these substances are considered hazardous, but does not serve directly as the basis for the proposed rule, which is based on emission control technology. More detailed descriptions of the health effects of these and other HAPs are available on-line at the EPA/OAQPS website (http://www.epa.gov/ttn/uatw/hapindex.html).

4.2 Impacts: Small Businesses

4.2.1 Comment: Two commenters (IV-D-3 and IV-G-6) believe that this rulemaking has been incorrectly certified, contending that no factual basis was provided for the Agency's certification of no significant impact on substantial number of small entities, and thus, EPA is not in compliance with provisions of the Regulatory Flexibility Act (RFA). The commenters said that EPA needs to review its certification and provide a factual basis for it or complete an initial regulatory flexibility analysis, as required by the RFA. The purported deficiencies in EPA's certification are given below.

1. The fact that there are less than 100 firms subject to the rulemaking does not mean the Agency can automatically certify that the rule will not have a significant impact on a substantial number of small firms. The Agency's guidance is flawed in that it would allow rule writers to bypass RFA requirements for rules affecting industries with less than 100 firms. The flawed guidance would also encourage rule writers to simply divide rulemaking actions so that no one particular rule affected more than 100 small firms. The guidance must be revised to avoid an arbitrary definition.

   Eleven commenters (IV-D-18, IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) support these points.

2. If the impacts described in section IV(H) of the preamble are impacts on either a specific number of, or even spread almost evenly among the seven small firms, this could be defined as a "substantial number,"

especially if those small firms bearing these impacts represent a significant portion of market share, or the affected will no longer be able to retain their status in the marketplace. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) believe that the seven small companies, that are approximately 16 percent of the total number of companies affected by the proposed rule, constitute a "substantial number" of small companies.

3. The Advocacy's Office of Economic Research is unfamiliar with the meaning of the wording that the rule has a "control cost share of revenue of less than one percent for all seven cement plants which are considered small entities." If the term "control cost share of revenue" is intended to mean that these small firms will be affected at less than one percent cost/sales, then there indeed could be a significant economic impact, depending on what profit margins are in the industry, and if the profit margins of these firms decrease. The wording does not provide any specifics relative to significant economic impacts and can be characterized as an unsubstantiated conclusion. Commenter (IV-G-6) concurs with these points and stated that EPA has not justified the selection of the one percent cutoff.

Response to issues 1 through 3: In accordance with the RFA, the Agency conducted a small business assessment and based its finding of "no significant impact on a substantial number of small entities" on the reported impacts of the proposed NESHAP on small businesses within the cement industry (Docket Item II-A-46,

Table 4-7; Docket Item IV-C-15). The Agency did not intend to suggest that this certification was based solely upon the number of small businesses potentially affected by the rule, nor that the Agency sets thresholds for determining whether a particular number of businesses is a substantial number or a particular impact is a significant impact. The EPA did not certify that the rule would have no significant impact on a substantial number of small firms based solely on there being less than 100 firms subject to the rulemaking (Docket Item II-C-14). To clarify the factual basis of EPA's determination and address subsequent comments, a summary of the Agency's small business assessment is provided below.

Based on SBA-defined small business criteria, the Agency originally identified nine of the 44 companies within the U.S. cement industry as small businesses, or roughly 20 percent of total. However, based on updated information and changes in ownership since 1993, the Agency determined that four of these companies should not be considered small businesses. The APCA indicated that there are currently seven small businesses within this industry. This list includes the remaining five identified by the Agency plus Dacotah Cement and Royal Cement Company. Dacotah Cement is owned by the State of South Dakota and, thus, was not considered a small business by the Agency. Royal Cement Company began operations in 1995 after the Agency had completed its small business assessment and, thus, was not included in the Agency's small business assessment because EPA's engineering and economic data base did not contain information on this relatively new facility.

The Agency typically uses the cost-to-sales ratio as a measure of impact on small businesses. This ratio refers to the change in the annual control cost divided by the annual revenue generated from sales of the particular good or goods being produced in the process for which additional pollution control is

required. It can be estimated for either individual firms or as an average for some set of firms such as affected small companies. While it has different significance for different market situations, it is a good rough gage of potential impact. In this case, to develop the cost-to-sales ratios, the Agency used the estimated control costs specific to the kilns operating at each manufacturing plant owned by a small business divided by their baseline cement sales. Contrary to industry's comments, the cost-to-sales measure of impact used by the Agency is a conservative approach and may, in fact, overstate the regulatory burden on small businesses for two reasons: 1) the Agency's sales estimate understates company sales because it only reflects cement operations and most companies have other vertical or horizontal business lines; and 2) this measure does not account for the expected market adjustments, i.e., increase in market prices that can potentially offset a portion of the regulatory costs.

For the economic impact analyses, the regulatory control costs were input to an economic model to predict outcomes at the market and plant level, including the impacts for markets served by manufacturing plants owned by small businesses. As shown in Table 4-7 of the EIA report (Docket Item II-A-46), the Agency did not project any plants or kilns owned by the original nine small businesses to close as a result of the proposed NESHAP.

As summarized in the Agency's June 10, 1998, letter to industry (Docket Item IV-C-15), a second small business assessment was conducted for the small businesses identified by the APCA. The weighted average cost-to-sales ratio for these small businesses was 0.93 percent with no plants or kilns projected to cease operations (Docket Item IV-B-5).

A third small business assessment was conducted to include the cost of PM CEMs and the monitoring of materials handling operations. (The promulgated rule requires the installation of

PM CEMs, and more frequent monitoring of materials handling operations than included in the proposed rule.) The new weighted average cost-to-sales ratio for the small businesses was 1.4 percent with no plants or kilns projected to cease operations. The resulting company-specific cost-to-sales ratios for this third analysis are as follows:

Armstrong Cement and Supply Corp:	3.0%
Capitol Cement Co.:	1.8%
Florida Crushed Stone:	0.6%
Monarch Cement Co.:	1.1%
Phoenix Cement Co.:	1.1%
Royal Cement Co.:	3.2%
Weighted Average:	1.4%

Further, to measure the relative regulatory burden on small businesses, the estimated employment changes and kiln closures can be compared for small businesses and for the whole industry. The whole industry incurs a 2.4% decrease in employment and a 1.8% decrease in kilns while for small businesses the decrease in employment is 8.9% and the decrease in kilns 3.1% See Docket Item IV-B-11 for this third small business analysis. While small businesses may be more heavily impacted by this rule than larger businesses, EPA still believes, based on the foregoing, that the impact on small businesses is not significant.

As discussed above, based on the Agency’s revised small business impacts assessments, which now include the cost of PM CEMs and other monitoring costs not considered at proposal, the Agency concludes that this NESHAP as promulgated will not have a significant impact on a substantial number of small businesses. Nevertheless, EPA will reassess, as appropriate, small business impacts in the future proposed rulemaking that will establish the date that PM CEMs must be installed on NHW cement kilns.

4.2.2 Comment: According to commenter (IV-D-18), section IV(H) of the preamble failed to include an assessment of cost impacts relative to sales across the whole industry and it also lacks any data specific to small business impacts.

Response: See the response to comment 4.2.1. Specifically, the summary of the Agency's small business assessment in that response provides the requested discussion. It indicates that data were available and impacts were computed for small businesses and that this information was used in the regulatory development process.

4.2.3 Comment: One commenter (IV-D-23) stated that the EPA may not have properly evaluated the number of sources which must be upgraded or replaced to meet the MACT standards. For example, Essroc will have to replace or upgrade six kiln APCDs and at least two cooler APCDs to meet the MACT PM emissions standards. The estimated cost for these APCDs is 17 percent of the total EPA estimate while these kilns are only about 7 percent of the portland cement capacity. Certainly, the rest of the industry will incur similar costs. The commenter projects the initial capital costs to be well over $100 million, which triggers the 1993 Executive Order #12866. The EPA should review the APCA cost data (attachment C in docket item IV-D-26 or docket item II-D-157) and recalculate its cost estimate accordingly.

Response: The costs to achieve compliance are expected to be highly site-specific and vary significantly. The EPA does not agree with the generalization that the rest of the industry will incur similar costs as those claimed (without substantiation) by the commenter. The commenter did not provide any details regarding their estimates of the cost to comply, so the EPA is unable to determine whether the commenter's cost estimates were limited to those costs necessary to comply with the provisions of the NESHAP.

The EPA has reviewed the APCA cost data submitted prior to proposal. The foundation for the cost estimates, and initial point of criticism of EPA's cost estimates, is the model plant characteristics. For example, the APCA report provided a review of the model plant characteristics and suggested that the design characteristics for each model be 20 to 25 percent higher than the annual average production rate basis for the model. In particular, the APCA report stated that the EPA model plant gas flows for wet process and long dry kilns were 25 to 30 percent too low, based on their consultant's design practice.

The EPA developed design characteristics for the model plants based on data provided to the Agency in ICRs and test reports (see docket items II-B-24 and II-B-37). For a kiln with a given nominal production rate that might be found in several different plants, variations in gas flow rates would be expected. The EPA used the flow rate and production data from actual installations to develop production rate versus gas flow graphs to establish the model plant characteristics. Owners may elect to design their upgrades or new equipment to accommodate higher production rates, but those additional costs and other impacts are not attributable to compliance with the MACT standards for their current plant production rate.

Other cost issues raised in the APCA report dealt with rebagging fabric filters or replacing an existing fabric filter with a new one. The APCA report claimed that induced draft fan replacement would be necessary to handle higher pressure drops associated with new fabrics or new fabric filters. Selecting alternative fabrics to improve performance does not necessarily result in increased pressure drops. Likewise, larger fabric filters do not necessarily result in higher pressure drops. In fact additional cloth area that lowers the overall air-to-cloth ratio in the fabric filter could reduce pressure drops as compared to those in the existing facilities.

The basis of the control costs for model plants estimated in the docket memoranda and proposal preamble is the Office of Air Quality Planning and Standards Cost Manual (docket item II-A-51). The cost algorithms in the manual were derived from control equipment vendor quotes, standard cost estimating factors, and contractor experience. Installation costs, utilities, maintenance, and other operating costs were estimated and included for impact estimation.

The EPA maintains that the costs provided in the proposal preamble are a reasonable basis for projecting the national impacts of the these rules. Additional information on control cost estimates is provided in the response to comment 4.3.3 of section 4. of this document.

4.2.4 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) believe that the portland cement NESHAP may have a substantial impact on small businesses for the following reasons.

1. Many of the seven small entities may be area sources. The dioxin/furan standard could be unduly burdensome to area sources in that they would face significant costs to limit their kiln temperatures. Costs would be more exorbitant if area sources were required to install activated carbon injection to meet the dioxin/furan standard.
2. Area sources would face substantial costs to meet the permitting, monitoring, and reporting requirements of the proposed rule.

Response: The small business aspect of this comment was addressed in the response to Comment 4.2.1 above. Activated carbon system installation is not required or expected as a result of the emission standards. Major source status will most likely be dependent on HCl and/or organic HAP emissions, and is

independent of the number of employees of the cement company.

4.2.5 Comment: One commenter (IV-G-6) noted that the non-burner HAPs coalition's (NBHC's) thirteen members include five SBREFA-protected small entities (Phoenix Cement, Florida Crushed Stone, Capitol Cement, Armstrong Cement, and Puerto Rican Cement). None of the NBHC members exceeds one million tons per year of clinker production or represents more than 1.2 percent of the industry.

Response: The commenter has misunderstood the information presented by the Agency. The commenter has assumed that the data presented represent clinker production and shares for the individual small companies listed in the comment. However, the clinker production and industry share figures reflect aggregate numbers for all small businesses identified by the Agency as opposed to an average or specific estimate for any individual small company's cement operations. Furthermore, the cement plants owned by Puerto Rican Cement and San Juan Cement were not included in the Agency's analysis because the Agency lacked the necessary data input to characterize these cement operations. In addition, publicly available information indicates that Puerto Rican Cement Co. had total employment of 939 and sales of $100.2 million as of 1995. Thus, based on the SBA-defined small business criteria of 750 employees, this company would not qualify as a small business.

4.2.6 Comment: One commenter (IV-G-6) stated that per EPA's June 10 letter (docket item IV-C-15), the outcome of EPA's assessment on impacts and the steps taken to minimize any impact should be discussed or summarized in the preamble to the rule.

Response: The EPA analyzed the impacts and selected the MACT floor control technologies. See the response to comment 4.2.1. Also, the preamble to the final rule does discuss the results of the three small business impacts analyses.

4.2.7 Comment: One commenter (IV-G-6) stated that EPA must have objective, reasonable certainty that there will be no pertinent impacts on small entities or it cannot validly certify. The EPA must create a testable record against which the validity of certifications could be judicially reviewed. [5 U.S.C. section 611(a) and (b).] The commenter further claimed EPA's SBREFA Guidance states that when EPA "cannot or does not certify that a proposed rule will not have a significant impact on a substantial number of small entities, it must prepare a regulatory flexibility analysis for the proposed rule." The commenter does not believe EPA has met this burden for the proposed rule.

Response: Section 605(b) provides an exemption from the requirements in sections 603 and 604 to conduct a regulatory flexibility analysis when the Agency “certifies that the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities.” The EPA has made this certification for this rulemaking. The EPA believes its interpretation of the requirements of the RFA is reasonable and that its factual basis for certification is also reasonable.

To the extent the commenter is suggesting that the RFA requires more than a reasonable basis for its decision to certify, the EPA disagrees. Courts review compliance with the RFA in accordance with Chapter 7 of the Administrative Procedure Act (APA), 5 U.S.C. section 701, et seq. [See 5 U.S.C. section 611(a)(1) and (2).] Under the APA, courts generally provide substantial deference to agency decisionmaking and will only set aside administrative actions or findings if the court concludes that the agency’s action or finding was arbitrary, capricious or otherwise contrary to law. [5 U.S.C. section 706(2)(A).] The Supreme Court has explained, “To make this finding the court must consider whether the decision was based on a consideration of the relevant factors and whether there has been a clear error of

judgment." Citizens to Preserve Overton Park v. Volpe, 401 U.S. 415 (1971). The EPA believes that its detailed economic analysis more than adequately supports its conclusion that the rule will not result in a significant impact on a substantial number of small entities.

At the commenter's request, the EPA provided the commenter a two-week extension (past the end of the comment period) so the

commenter could obtain financial data from small businesses, but the commenter provided no data to EPA.

4.2.8 Comment: One commenter (IV-G-6) believes SBREFA can only be interpreted to allow numerical cutoffs based on the percentage of all small entities in the regulated universe that experience any impact. The commenter contends that when a rule impacts all the small entities in an industry, the statute *a fortiori* requires an analysis of whether those impacts are significant, and precludes a certification based solely on any absolute number of small entities impacted. By the same token, if the percentage of small entities experiencing any impact is more than *de minimis*, a similar analysis appears required. The commenter contends that this concept has been repeatedly recognized by EPA findings that impacts on more than 20 percent of the small entities within a universe proposed to be regulated constitute a "significant number." [61 FR 48206, 48228 (September 12, 1996); 59 FR 62585, 62588 (December 6, 1994).] It also lies at the heart of the "impacts" matrix in EPA's SBREFA Guidance. The commenter notes that under that matrix, greater "impact" priority is assigned to rules that will impact a larger percentage of small entities, even if the impacts are relatively low.

Response: Other than small entities, the RFA does not define the term, or any part of the term, "significant impact on a

substantial number of small entities." Thus, the statute does not specify whether an agency may properly certify a rule either because there is not a significant impact on small entities, or because, even if the impact is significant, there are not a substantial number of small entities affected. In any event, EPA has chosen not to establish any mechanistic approach for determining when an impact is significant or when the number of small entities is substantial. Instead EPA considers a variety of approaches depending on the particular circumstances of the rulemaking. In general, EPA looks at both the extent of the potential impact and the number of small entities impacted to decide whether a more detailed regulatory flexibility analysis pursuant to sections 603 and 604 of the RFA is warranted. The EPA's Guidance repeatedly explains that the criteria offered in the Guidance cannot be applied mechanistically and that rule writers should consider other relevant information in deciding whether or not to certify a rule.

EPA's analysis of both the number of small entities impacted and the extent of that impact are described in the response to comment 4.2.1. As described in that response, the EPA has not certified this rulemaking based solely on the number (or percentage) of small entities affected.

4.2.9 Comment: One commenter (IV-G-6) stated that it is quite likely that at least half the small entities affected will have compliance costs well in excess of EPA's 1.03 percent of sales revenues" figures. The EPA has not stated what the reasonable worst-case impacts on any single plant would be, or explained why such impacts would not likely fall on many or most small entities. When there are seven affected small entities, using averaged national cost impacts cannot satisfy EPA's SBREFA burden and does not satisfy EPA's SBREFA Guidance. The Guidance relates to the percentage of small entities that may experience

economic impacts in excess of 2 percent of yearly sales. But EPA has no idea how many small entities may experience such impacts because the economic analysis netted out all the impacts in multiple cumulative ways. With this modeling approach, it is reasonably likely that 40 percent of small entities would have impacts in excess of 4 percent of sales, while the rest experience virtually no impact. But EPA would never know whether this was the case.

Response: See the response to comment 4.2.1. As discussed, two additional small business assessments were conducted since proposal, in response to comments at proposal, and to account for additional monitoring requirements not included at proposal. Specifically, response 4.2.1 provides the company-specific cost-to-sales ratios used in computing the average ratio of 1.4 percent, as a result of the third small business analysis it conducted. As shown in the response, the individual ratios range from 0.6 percent to 3.2 percent. Therefore, the Agency's use of an average ratio does not "net out" the "worst-case impacts" on any single firm as contended by the commenter. At the commenter's request, the EPA provided the commenter a two-week extension (past the end of the comment period) so the commenter could obtain financial data from small businesses, but the commenter provided no data to EPA.

4.2.10 Comment: One commenter (IV-G-6) stated that based on the Guidance, EPA cannot effectively net out impacts across an entire industry and then certify the rule has no significant impact. That route would ignore an important part of the "impacts" problem-the severity of the impacts on a significant percentage of individual sources. A rulemaking action is arbitrary per se if the EPA "entirely failed to consider an important part of the problem." Motor Vehicle Manufacturers Association vs State Farm Mutual Insurance Company, 463 U.S. 29,

43 (1983).

Response: See the response to comment 4.2.1. Specifically, the Agency did not intend to suggest that certification of no "significant impact on a substantial number of small entities" was based solely upon the number of small businesses potentially affected by the rule, nor that the Agency sets thresholds for determining whether a particular number of businesses is a substantial number or a particular impact is a significant impact. As shown by the summary of the Agency's small business assessment, the basis of this certification was based on a conservative approach that estimated cost-to-sales ratios for individual small companies to determine potential worst-case impact.

4.2.11 Comment: In docket item IV-G-6 the small business Royal Cement stated that "ignoring the smallest of the 'small' is undermining the validity of EPA's study... Because of our small size, any new mandated expenses will affect us disproportionately and quite possibly put us out of business, even though our small size would probably not have any discernable impact on the environment."

Response: The Agency began its analyses in support of the proposed NESHAP in 1990-91 with an information collection request (ICR) survey of industry. Based on these responses and publicly available data, EPA then conducted the necessary engineering, economic impact analysis, and small business assessment through 1995 using a baseline year for its analysis of 1993. Royal Cement Company did not exist until 1995 and, thus, this company and its cement manufacturing plant were not part of the Agency's engineering or economic analysis. Publicly available sources do not allow the Agency to identify current sales data for this company. Based on 1995 data, the Agency has estimated the cement sales for Royal Cement Company to be roughly $6.5 million (docket

item IV-B-5). Furthermore, based on the appropriate model kiln, and the second and third small business analysis, respectively, the engineering estimate of annual control costs for this company was $208,000 per year (docket item IV-B-4) and result in a cost-sales ratio of 3.2 percent.

While the worst case results of this quick analysis may indicate a relatively significant impact for this source, EPA believes that its overall conclusions regarding the impact of this rule on small entities are still valid. As described in the response to comment 4.2.1, EPA's cost to sales revenue approach is a conservative one. Moreover, EPA suspects that, given the newness of the Royal Cement plant, control costs will not be on the high side of the projected range.

New sources should have considered having to meet the MACT standards in analyzing the portland cement market.

4.2.12 Comment: One commenter (IV-G-6) stated that in docket item II-D-204, industry concludes from its modeling that kiln closures will fall primarily on older and smaller kilns. Of the 15 small-entity kilns that NBHC reviewed, nine or 60 percent of those kilns are over 30 years old and most are relatively small. The commenter projects that small businesses will be closed by the proposed MACT standards.

Response: The findings from the Agency's economic impact analyses showed that four kilns are expected to close as a result of the proposed NESHAP. The Agency's estimate of kiln closure are consistent with industry's characterization of kilns likely to close in that they both are older and smaller than average kilns. As reported in the second EIA report, less than one half of a kiln (0.4) of those owned by a small business are expected to close. In addition, the Agency's economic analysis (conducted for the proposal) of above-the-floor options predicted closure of between 6 and 10 kilns, each of which had annual clinker capacity

of less than 500,000 short tons. The EIA report for the proposal of above-the-floor options showed that 1 to 2 of these kilns projected to close were owned by a small business, or roughly 20 percent. However, the Agency did not select an above-the-floor option for proposal.

4.2.13 Comment: One commenter (IV-G-6) stated that EPA will have to do or redo a complete SBREFA analysis prior to proposing the use of PM CEMS.

Responses: EPA agrees with the commenter, and has conducted a new EIA and small business impacts analysis to include the cost of PM CEMs. See docket items IV-A-4 and IV-B-11. Although PM CEMs are required as part of this rulemaking, the installation date for the PM CEMs is being deferred until a future rulemaking. EPA will reassess, as appropriate, small business impacts in that future proposed rulemaking that will establish the date that PM CEMs must be installed on NHW cement kilns.

4.3 Impacts: EPA Economic Analysis

Please note that the following responses address the comments that are specific to the EIA conducted for the regulation, as proposed. As discussed in the preface to this chapter, the economic impacts have been reanalyzed (denoted as Appendix G of the original EIA, docket item IV-A-4), and the national cost impacts have been updated (docket items IV-B-8 and IV-B-9). The following are the comments and responses for the economic impacts as described at proposal, with reference to the updated analyses, where applicable.

4.3.1 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) believe that the final EPA economic analysis at proposal was inaccurate and should be either revised to reflect industry's

comments (in Attachment G[4] to docket item IV-D-26) or withdrawn.

Response: The EPA disagrees with the preceding comments suggesting the analysis is inaccurate and should be withdrawn. The Agency has developed its economic analysis based on the best available information using an accepted approach firmly rooted in economic theory to provide the necessary impact results to satisfy legislative and administrative requirements. Furthermore, following proposal, the Agency conducted a revised economic impact analysis in response to the additional monitoring requirements for cement kilns and materials handling operations at major source cement plants (as fully described in Appendix G recently added to the July 1996 EIA report, Docket Item II-A-46). In conducting this revised analysis, the Agency also updated the original 1993 baseline information that supported the economic analysis for proposal to 1995 and is thereby consistent with the baseline used by the Agency for the Cement Kiln Dust (CKD) rulemaking and Hazardous Waste Combustion MACT Standards. This adjustment to the baseline characterization results in some differences in the projected economic impacts from the proposal analysis. In particular, under 1995 baseline conditions, the model predicts an aggregate loss in industry profits because of the sharp reduction in excess U.S. cement capacity from 1993 to 1995. This increase in capacity utilization to roughly 94 percent in 1995 severely limits the ability of unaffected (and slightly affected) domestic producers to offset production declines at affected cement plants. As a result, the potential profit gains to these producers from offsetting these reductions is no longer present in 1995 as in 1993 and the economic model predicts an aggregate loss in pre-tax earning of the U.S.

[4]Letter from A. T. O'Hare, American Portland Cement Alliance, to T. Walton, U.S. EPA/OAQPS/AQSSD/ISEG, transmitting comments on the May 1996 "Economic Analysis of Air Pollution Regulations: Portland Cement."

industry, which is consistent with the expectations of the commenter. However, this occurs through the difference in baseline characterization rather than flaws in the Agency economic model and approach.

First, the industry's comments are specific to a draft version of the EIA report that has been revised. Comments were addressed in changes to the analysis prior to proposal as follows:

1. As the commenters suggested, the economic model incorporated a more realistic assumption for the elasticity of supply from foreign imports. The U.S. International Trade Commission's report of August 1990 on its dumping investigation of grey Portland cement from Mexico suggests that the supply elasticity of foreign imports to the southern-tier of the United States is between 6 and 8. Although this parameter is likely to vary across regions and foreign sources, the absence of region- or source-specific estimates of this parameter necessitated the Agency to assume a value of 7 for all foreign sources to each U.S. market (i.e., the mid-point of the U.S. ITC range). This higher value for the import supply elasticity more appropriately accounted for the significance of foreign imports of cement in determining the changes in market outcomes (i.e., prices and output) associated with imposition of the proposed NESHAP. Furthermore, contrary to industry comments, the Agency accounts for <u>all</u> foreign imports of cement to the United States by mapping these volumes to the appropriate regional market based on the port of entry as provided by the U.S. Geological Survey (formerly the U.S. Bureau of Mines).
2. According to the commenter, the draft EIA report did not adequately describe the basis for defining the regional markets used in the economic analysis. This led to some

confusion and/or misinterpretation by the industry as reflected in its comments. Contrary to industry assertions, the Agency's economic model does not omit any market areas as all U.S. production and consumption of cement is accounted for within the 20 regional markets as defined by the Agency. A description of the geographic areas for each regional market was added to Appendix D of the final EIA report. For example, this description clearly shows that the model does not "ignore competition in large parts of the country" such as the Mountain time zone and the North-Central region as stated within industry comments. The economic literature cited in the draft EIA report was a starting point in selection and characterization of the 20 regional markets. The Agency based its market definition on industry accepted limitations to the economic transport of cement and on company-specific descriptions from SEC 10K filings of the markets served by their manufacturing plants (See 10K filings of Medusa Corp., Southdown Inc., and Lone Star Cement Corp.). Therefore, the Agency utilized the best available information in defining these regional markets to better account for the regional competition within the industry.

3. The commenters claimed the draft EIA report did not adequately describe the basis for selecting the imperfectly competitive market structure for the cement industry and the implications of this selection of the economic impact results. The Agency's selection of market structure was not an attempt to distort the economic impact results or to infer that the industry is collusive and lacks any competition. Rather it was selected to provide better estimates given well-known characteristics of the industry. In microeconomics courses, cement provides one of the textbook cases of imperfect competition. As opposed to the

price taking behavior of firms under perfect competition, the Agency has selected an imperfectly competitive market structure that stresses the strategic interaction across cement producers and accounts for their ability to influence market price. This characterization of competition for cement is due to a number of factors including: 1) low value to transport cost that limits cement to localized or regional markets, 2) high fixed investment cost for capital equipment (rotary kilns) that limit market entry[5], and 3) substantial returns to scale such that the minimum efficient cement operations are a large share of local demand and thereby limit the number of suppliers within each market. These factors are well-documented in the economics literature and allow cement producers to influence market prices because of the limits to the geographic extent of markets and market entry. However, the lack of price taking behavior does not equate to a "lack of competition." Cement producers are not treated as monopolies, which is the extreme case of imperfect competition where the firm is the only market supplier and sets market price and output without any competitive forces. The Agency has appropriately modeled the competitive interaction between domestic producers of cement as well as foreign imports (where applicable) within each regional market in a manner that is consistent with the empirical evidence for cement markets and economic theory.

The other industry comments from Attachment G to docket item IV-D-26 are included or relate to comments summarized below with

[5] The Portland Cement Association's web site states that "the cost of a modern cement plant is $175 per ton of annual capacity, or about $150 million for an 850,000-ton-per-year plant. Economists estimate that about three dollars of capital investment is needed to produce one dollar of annual sales."

the corresponding Agency response to each.

4.3.2 Comment: One commenter (IV-G-6) stated that EPA's model economic impacts data are seriously flawed for the following reasons.

1. The model would not detect company-level impacts. For instance, a small entity might not be able to get a loan to buy pollution control equipment.
2. The economic analysis is not based on any estimate or analysis of actual small-entity impacts but is based on an aggregated industry wide economic model based on theoretically constructed model kilns. (EPA's model lumps smaller kilns in with mid-size kilns into a large class that comprises 70 percent of all kilns, instead of developing cost functions that could simulate the economics of the smallest 25 percent of the kilns.) This produces uncertainties as to which kilns might close.
3. The model predicts that older smaller dry kilns will close, which is counterintuitive because wet kilns are substantially more costly to operate per unit of product. This result was attributed to the market-specific configurations of competing kilns used in the model.
4. According to ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6), flaws in the market-specific part of the model were identified by Environomics, Incorporated in docket item II-D-204 (which is Attachment G to docket item IV-D-26). The two factors which lead directly to the modeled conclusion that profits will increase with more stringent control include:
   a. assignment of plants to exclusive, distinct and

arbitrary markets, and

b. the incorrect assumption that cement plants function as monopolies within fairly large geographic regions and not as businesses with competition from imported cement, improved transport and other factors.

Response: The Agency does not agree with industry's characterization of its modeling approach as "seriously flawed." The Agency developed its economic analysis based on the best available information using an accepted approach firmly rooted in economic theory. The Agency provides responses to the specific comments below.

1. The economic impact analysis does allow the Agency to detect company-level impacts by aggregating the estimated control costs and related economic impacts at all manufacturing plants owned by each company, both large and small. These impacts are used to assess the potential effect of the proposed NESHAP on small businesses (Please see response to Comment 4.2.1). Although the issue of capital availability is an important consideration for small businesses, it is not typically addressed in EPA economic analyses of regulatory actions as it requires company-specific information not available to the Agency and, moreover, there is not a generally accepted method with which to model and analyze this complex issue in the context of environmental regulation.
2. The Agency's characterization of costs at individual kilns was based on the econometric estimation of cost functions for cement kilns by Das (1991 and 1992). Using the best information available, EPA made adjustments to these cost functions to better reflect the operating costs of kilns by process type and capacity (as fully described in Appendix C

of the EIA report, docket item II-A-46). However, in accounting for size or economies of scale in estimating baseline operating costs, the Agency was limited by the two capacity size classifications of less than and greater than 500,000 short tons per year for which labor productivity and fuel consumption were reported by the Portland Cement Association. This data limitation prevents the EPA from developing baseline cost functions for very small kilns and, effectively, "lumps smaller kilns in with mid-size kilns into a larger class" of all kilns as stated by industry. Therefore, it is possible that the EPA's economic model understates the baseline operating costs at very small kilns. However, the Agency is able to estimate the incremental compliance costs for many categories of kiln capacity below 500,000 short tons per year ranging from 55,000 to 450,000 short tons per year. This more detailed classification scheme for estimating the regulatory compliance costs reduces the uncertainty related to the Agency's estimates of kiln closures.

3. The Agency agrees with the industry comment that wet kilns are generally more costly to operate, which has contributed to their use of hazardous waste to reduce their fuel costs and remain competitive with the dry process kilns, especially those using precalciner and/or preheater technologies. However, the economic impacts of the proposed NESHAP depend not only on the baseline costs of cement production but also on the incremental costs of compliance for each kiln. The proposed NESHAP largely impacts non-hazardous waste burning kilns as opposed to hazardous waste kilns that are most often wet process kilns. As stated in the EIA report (docket item II-A-46), it is the higher relative incremental cost impact compared to that for its competitors that causes the Agency's model to project

closure for two dry process kilns under the proposed NESHAP. Furthermore, the baseline costs of cement production were high for these kilns because they were each older and smaller than average. Thus, the projected closures are actually consistent with the industry's statement that older and smaller kilns are more vulnerable to closure with regulation. Moreover, in the EIA report for the proposal (docket item II-A-46), the Agency provides closure estimates for additional regulatory alternatives and, for more stringent "above-the-floor" alternatives, the economic model projects up to 10 kilns to close including 5 wet process kilns. Thus, the Agency believes that its economic model produces closure estimates that are consistent with the industry's characterizations.

4. Although the Agency projects a net increase in profits for the cement industry as a whole in response to regulation, there is a "social cost" to reducing hazardous air emissions from the manufacture of cement. As shown in the EIA report prepared for the proposal (docket item II-A-46), the Agency estimates that society must give up $34.5 million per year for the expected environmental benefits (as compared to the $28.8 million in regulatory compliance costs incurred by industry after market adjustments). Furthermore, the two factors cited by industry are not the reason for the model's prediction of a net increase in profits for the industry as a whole. First, it is important to restate that the projected increase in profits for the industry as a whole is a net change resulting from profit gains at unaffected or relatively less affected producers (e.g., change in price is greater then incremental compliance costs per unit) and profit losses at relatively greater affected producers (i.e., change in price is less than incremental compliance costs per unit). Second, this outcome is not uncommon as

there are a number of situations that have been identified in the economics literature and previous EIAs conducted by the Agency for which this outcome can occur: 1) a non-parallel shift in the market supply curve in which more marginal producers get higher regulatory costs per unit of output so that market prices increase sufficiently to increase profits of most, if not all, inframarginal producers [See Miller, Rosenblatt, and Hushak (1988) and Maloney and McCormick (1982)]; and 2) a demand curve that is less elastic (more inelastic) than the supply curve in which a sufficient portion of the regulatory costs are passed onto consumers that allows for a net profit gain for producers. For each of these situations, the net change in industry profits is positive as the “winners” gain more than the “losers” lose due to regulation. Therefore, this outcome is determined by the baseline characterization of supply and demand and the imposition of compliance costs across cement producers as opposed to the oligopoly market structure.

Although the Agency assigns cement plants to distinct markets the determination of these markets is not arbitrary. Instead, the Agency based its market definition on industry accepted limitations to the economic transport of cement and on company-specific descriptions of the markets served by their manufacturing plants as obtained from their SEC 10K filings (See 10K filings of Medusa Corp., Southdown Inc., and Lone Star Cement Corp.). In addition, the commenters improperly characterize the level of competition modeled for each regional market. Cement markets provide the textbook case in economics courses of imperfectly competitive markets, which is quite different from the extreme case of monopoly as referenced by the commenter. Contrary to the commenters assertion, the “oligopolistic” market structure for cement does not imply a lack of competition rather it stresses the strategic interaction between cement producers.

It recognizes that their actions can influence the observed market price of cement as opposed to the price taking behavior of producers under perfect competition in which individual producers cannot, by assumption, effect the market price. The Agency believes that it has appropriately modeled the competitive interaction between domestic producers of cement as well as foreign imports (where applicable) within each regional market in a manner that is consistent with the empirical evidence for cement markets and economic theory.

4.3.3 Comment: One commenter (IV-G-6) stated that the EPA's economic model understated "costs of control" (as compared with the industry estimates in docket item II-D-157). Examples of these understated costs are given below.

1. Capital and operating costs that were used in the model were in many cases significantly lower than current or historical averages.
2. Gas flows in the EPA model kilns should have been more than 25 percent higher, for some types of kilns. This would result in significant differences in capital and operating costs of equipment.
3. The EPA did not include lost production costs incurred during shutdown to retrofit or add an APCD.
4. The EPA did not estimate costs for gas cooling towers that will often be required for effective temperature control. Gas cooling towers are generally three times the EPA estimates for temperature control.
5. The EPA contingency costs are severely understated based on industry practice. The EPA costs are typically not applicable until all purchased equipment has been received and installation contracts negotiated.
6. In most cases, the industry-estimated annual operating

costs were substantially higher than EPA estimates. This included a fivefold difference in annual operating costs for gas cooling towers.

7. It is not clear whether EPA included all or properly reflected costs of: monitoring, record keeping and reporting for point sources, raw material dryers or material handling facilities, training costs for employees to conduct monitoring and comply with reporting requirements, costs associated with meeting an opacity corrective action trigger of 15 percent (which effectively requires that PM controls keep opacity below 15 percent.
8. The EPA's assumptions of a 20-year equipment life and a 7 percent discount rate in annualizing capital costs significantly misrepresent how the industry will treat these costs in deciding whether to make the MACT compliance expenditures. Most cement companies use a required payback within 3 to 5 years as their criterion.

The commenter contends that EPA has an obligation to use cost figures documented by industry or supply its own reasonable worst-case estimates, when conducting an analysis to support SBREFA nonapplicability based on "model plants." It is not credible for EPA to ignore these extensive cost differences or assume that the cheapest temperature reduction technology will be universally applicable. Even if EPA's cost inputs are documented, they are neither median nor worst-case.

Response: The basis of the control costs for model plants estimated in the docket memoranda and proposal preamble is the Office of Air Quality Planning and Standards Cost Manual (docket item II-A-51). This cost manual is prepared by the EPA and updated periodically to reflect changes in design and estimating

practices. The year for which cost data are prepared is reported in the manual, thus allowing the user to escalate cost estimates using appropriate cost indices to convert the cost to the year for which the analysis is to be conducted.

The cost algorithms in the manual are derived from solicited control equipment vendor quotes, standard cost estimating factors, and contractor experience. In addition to purchased equipment cost, installation costs based on cost factors, utilities, maintenance, labor, and other operating costs were estimated for each model plant and included for impact estimation. These estimated cost and cost factors have been verified through follow up contacts with vendors and comparisons with facilities having known costs of control. The costing procedure also allows for revising time-sensitive costs such as labor rates and utility costs.

The EPA has reviewed the APCA cost data submitted prior to proposal. The foundation for the cost estimates, and initial point of criticism of EPA's cost estimates, is the model plant characteristics. The APCA report provided a review of the model plant characteristics and suggested that the design characteristics for each model be 20 to 25 percent higher than the annual average production rate basis for the model, for example. In particular, the APCA report stated that the EPA model plant gas flows for wet process and long dry kilns were 25 to 30 percent too low, based on their consultant's design practice.

The EPA developed design characteristics for the model plants based on data provided to the Agency in ICRs and test reports (see docket items II-B-24 and II-B-37). For a given nominal production rate kiln that might be found in several different plants, variations in gas flow rates would be expected. The EPA used the flow rate and production data from actual installations to develop production rate versus gas flow graphs

to establish the model plant characteristics. Owners may elect to design their upgrades or new equipment to accommodate higher production rates, but those additional costs and other impacts are not attributable to compliance with the MACT standards for their current plant production rate.

With respect to the issue of lost production costs incurred during shutdown to retrofit or add an air pollution control device, those costs were not included in EPA's estimates. The EPA assumed such shutdowns would not be of long duration and could coincide with periodic maintenance during which kilns are shutdown. For example, provisions can be made to build additional gas treatment volume as a module to be added to existing equipment in as little time as a day or two. *[They estimated 60 days downtime for adding an ESP field.]*

Spray cooling without using a separate spray chamber can be accomplished satisfactorily if attention is paid to system design and equipment location. Important variables are duct orientation, spray nozzle location, spray pattern, and droplet size. The system requires close monitoring and control. Systems with these characteristics are the basis for gas cooling costs used to compute impacts of the standards. Costs of the system elements are derived from vendor-supplied data.

The commenter's reference to contingency costs being severely underestimated was made in the Docket Item II-D-157 primarily in reference to scrubbers, spray dryers, and carbon injection systems that are not required to comply with the proposed and promulgated standards. While contingency allowances of 20 percent may be a common practice, the EPA does not include such large allowances for undocumented costs in calculating compliance costs.

With regard to estimated operating costs, an advantage of using in-duct cooling is the absence of a separate piece of

equipment that adds pressure drop to the emission control system. Reduced gas volume attributable to gas cooling can produce reduced control device costs because of the lower volume throughput.

Monitoring, recordkeeping, and reporting costs were included in EPA's monitoring and performance test costs and burden estimates. Opacity corrective action triggers for kilns and in-line kiln/raw mills are not included in the final rule.

Cement plants may make decisions regarding MACT expenditures on the basis of 3 to 5 year payback, but the EPA is not attempting to duplicate the process by which the owners make those decisions. The annualized cost estimate must include a cost element related to depreciation or amortization of the capital investment over the useful life of the equipment. A 20-year equipment life at a 7 percent discount rate is the basis selected for making these estimates for all rules based on current EPA policy.

The EPA maintains that the costs provided and documented in the proposal preamble and associated docket items are a reasonable basis for projecting the national impacts of the these rules.

4.3.4 Comment: One commenter (IV-G-6) stated that the EPA assumed a national applicability percentage for each control option. The commenter takes issue with the 42 percent factor used for gas temperature control. It is not reasonable to conclude that on an industry-wide basis less than half of all kilns will require some form of temperature control. Such assumptions skew predicted cost impacts towards the low end from the start and make the cost modeling unusable for the SBREFA.

Response: The commenter specifically states that EPA had temperature data on 14 kilns, 7 of which had average stack temperatures (as opposed to control device inlet temperature)

above 400 degrees F. However, gas temperature is not necessarily the best indicator in determining how many facilities will have to install gas cooling equipment. The reason gas cooling may be required is to reduce D/F emissions from those facilities that exceed the emission standard. Gas temperature is only one factor affecting D/F emissions. Data shown in Table 8 of the proposal preamble indicate that there are facilities where the gas temperature exceeds 400 degrees that meet the D/F standard. The facilities from which D/F data were collected were not specifically selected for their low D/F emissions. About 75 percent of the facilities listed in Table 8 are achieving D/F emission levels that would comply with the standard without incurring additional costs for gas cooling.

Nevertheless, in Docket Item II-B-80, temperature data were examined for the purpose of selecting the factor used in impact estimates, without considering what the present D/F emissions were from each facility. Some of the temperature data available were only available as stack temperature as opposed to control device inlet temperature. In analyzing the data there were three stack temperature points in the range of 350 to 370 ^{o}F that may or may not be associated with control device inlet temperatures under 400 ^{o}F, given that there may be a 50°F difference between temperatures at the stack and inlet air pollution control device. All the other data could be interpreted unequivocally as above or below 400 ^{o}F. Analyzing the data with those three points in the above 400 ^{o}F group showed 50 percent of the facilities had temperatures above 400 ^{o}F. Changing those three points to the below 400 ^{o}F group showed 35 percent of the facilities had temperatures above 400 ^{o}F. The average of the two cases, or 42 percent was selected. The EPA believes the 42 percent assumption is reasonable. The EPA used the available data in developing the assumption of 42 percent and notes that the commenter provided no data to support his comment.

4.3.5 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA's economic analysis concluded that there is no correlation between kilns that would need PM control upgrades and those that would need temperature control equipment. These costs were assigned independently to the model kilns. Industry believes that the most economically vulnerable kilns (i.e., older, smaller, not updated) are more likely to require control (as stated in docket item II-D-157). Kilns at a plant will tend to be of similar design and vintage, so that all or none will tend to need upgrading. The need for PM controls for the kiln and clinker cooler plus temperature controls will tend to cluster at the same kilns based on age (older) and company size (smaller). Smaller older kilns are most likely to require MACT controls because they have been grandfathered from the NSPS, have slimmer profit margins for past renovations, and have postponed investments in pollution control measures. The burden on smaller kilns will be especially acute since they have lower economies of scale. Most of the small and smaller kilns affected by this rule fit this profile which EPA essentially ignores. Thus, the random assignment of the costs to individual kilns leads to understated impacts. The EPA could improve its model by assigning compliance costs randomly to plants rather than to kilns.

Response: Older kilns, e.g. those kilns not subject to the NSPS, may be more likely to need upgraded or new PM controls for kilns and clinker coolers to comply with the PM standard. However, the EPA does not agree that these same kilns will necessarily be those with high D/F emissions that will require combustion improvements and/or additional gas cooling to comply with the D/F standard. The EPA is unaware of a rationale for expecting higher D/F emissions to correlate with those kilns that do not comply with the NSPS.

4.3.6 Comment: One commenter (IV-G-6) stated that EPA's model irrationally overstates sales. Since the costs of compliance are compared to sales revenues, overstating revenues will understate this ratio and therefore will understate impacts.

Response: The Agency does not agree that its economic approach "irrationally" overstates cement sales. The basis for industry's comment is that the Agency does not properly account for the markets served by individual cement plants and, in some cases, assigns these plants to markets with prices that are lower than the industry argues are actually received by the plant. The Agency agrees with the commenter that market boundaries are subject to change based on changes in shipping costs and cement prices; however, the significance of these possible market overlaps and their influence on the model results are overstated by the industry. The Agency based its market definitions on industry accepted limitations to the economic transport of cement and on company-specific descriptions from SEC 10K filings of the markets served by their manufacturing plants. According to the PCA (1998), the low value to transport costs of cement limits the vast majority of cement produced in the United States to be shipped less than 300 miles. This fact limits the extent to which individual cement plants can serve other markets. The Agency acknowledges the possible overlap of market areas, but the volume of cement that the industry contends would serve other markets by extending the market boundaries is very small compared to the total volume of cement for each regional market. Therefore, the Agency does not believe its characterization of distinct regional markets "significantly" bias the Agency's model results as claimed by the industry. In fact, within these market overlaps, it is also likely that the other market served has a higher price as opposed to the situation of a lower price highlighted by industry's comments. In this case, contrary to

the commenters claim, the Agency's model would slightly understate cement sales.

Furthermore, in developing the cost-to-sales ratios, the Agency used the control cost estimates specific to the kilns operating at each manufacturing plant owned by a each business entity and divided by their projected cement sales. Contrary to industry's comments, the cost-to-sales measure of impact used by the Agency may overstate the regulatory burden on small and large businesses for two reasons: 1) the Agency's sales estimate understates company sales as it only reflects cement operations and most companies have other vertical or horizontal business lines, and 2) this measure does not account for the projected market adjustments, i.e., increases in market prices that can potentially offset a portion of the regulatory costs and thereby dampen the reduction in profits. In fact, the Agency's economic analysis for the proposal indicates that increased revenues will have this offsetting effect on profits for some cement producers.

4.3.7 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that the economic analysis surprisingly predicts that cement plants' pre-tax earnings will actually increase by $0.31 to $0.85 for every dollar spent on MACT compliance costs (based on the projection that prices these plants can charge will increase between 155 percent to 213 percent of MACT compliance costs). These outcomes defy common sense but were justified in the economic analysis on the "dynamics of the oligopolistic markets for portland cement." However, this does not exist in this industry. Such results amount to sheer speculation which does not meet SBREFA requirements.

Response: The cost-to-sales ratios that serve as the basis for the small business assessment to meet SBREFA requirements are not related to the economic impact results referenced by the

commmenter. The sales estimates used in computing these ratios for the small business assessment are measured for the baseline conditions and do not account for market adjustments estimated for the proposed NESHAP. The commenter has also incorrectly interpreted and presented the Agency's economic impact results. First, the economic analysis projects a net increase in the U.S. cement industry's pre-tax earnings, which reflects profit gains at unaffected or relatively less affected cement plants and profit losses at affected plants that incur higher relative compliance costs. Thus, the commenters' statement that each cement plant's pre-tax earnings will increase by X dollars for every dollar spent on compliance is incorrect as these impacts are distributed across different plants. Also, the estimated price increase applies to all cement produced by U.S. manufacturing plants whereas the MACT compliance costs apply only to cement produced at affected plants. Therefore, the commenters' calculation of the projected price increase as a share of MACT compliance costs is also incorrect as the commenter is understating the relevant change in cost by dividing the MACT compliance costs by all cement produced rather than only the affected share of cement production. It is the highest incremental cost impact across cement producers within a market that determines the ultimate increase in market price. The projected price increases range from 40 to 60 percent of these incremental compliance costs as appropriately computed.

Moreover, the commenter has mistakenly attributed the Agency's projection of a net increase in industry profits associated with the proposed NESHAP to the use of an imperfectly competitive, or oligopolistic, market structure for cement. The remainder of this response provides the commenter with information to better understand the impacts estimates and demonstrates that these results are not dependent upon the market structure assumption and, thus, credible and do not "defy common

sense."

The projected increase in pre-tax earnings is a net result for the industry that results from losses at some cement plants that are offset by gains at other cement plants. These economic impact results do not "defy common sense" as it has been shown that there are situations absent "oligopolistic markets" where this outcome is logical and consistent:

1. a non-parallel shift in the market supply curve under which more marginal producers get higher regulatory costs per unit of output so that market prices increase sufficiently to increase profits of most, if not all, inframarginal producers [Please see Miller, Rosenblatt, and Hushak (1988) and Maloney and McCormick (1982)]; and
2. a market demand curve that is less elastic (more inelastic) than the market supply curve under which a sufficient portion of the regulatory costs are passed onto consumers that allows for a net profit gain for producers.

For each of these situations, the net change in industry profits is positive as the "winners" gain more than the "losers" lose due to regulation. Therefore, this outcome is determined by the baseline characterization of supply and demand and the imposition of compliance costs across cement producers as opposed to the market structure assumption. Moreover, the selection of an "oligopolistic" market structure for cement was based on well-defined characteristics of the industry (Please see response to Comment 4.3.1 part 3). This market structure and its appropriateness for cement has been discussed and tested empirically in the literature. It does not imply a lack of competition rather it stresses the strategic interaction between cement producers. It recognizes that their actions can influence the observed market price of cement as opposed to the price taking behavior of producers under perfect competition. Although the Agency agrees that the cement industry has become more

competitive since then, it has appropriately modeled the competitive interaction between domestic producers of cement as well as foreign imports (where applicable) within each regional market in a manner that is consistent with the empirical evidence for cement markets and economic theory.

4.3.8 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that little of the economic information (about individual cement plants, cement shipments, and sales in different markets) that is needed to implement the economics impacts analysis is publicly available. As a result, EPA made many simplifying assumptions in order to develop the economics model, and the model does not accurately reflect the economics of the industry. Incorrect assumptions and estimates included:

1. typical variable costs of cement production
2. production, investment, compliance, and closure decisions
3. cyclic nature of cement demand
4. arbitrary selection of 20 markets
5. arbitrary assignment of plants to one independent market
6. economies of scale.

Response: The Agency has responded to each of the commenters' specific points below:

1. The Agency appreciates the industry's review and comments regarding its estimates of variable cost estimates for cement production. Despite the industry's comments, the Agency believes that the theoretical and empirical representation of constant marginal costs at cement kilns is appropriate and well documented in the literature [for example, please see Das (1992 and 1991), Capone and Elzinga (1987), and McBride (1983 and 1981)]. In fact, this

specification is supported by the fixed factor method of computing these operating costs as employed by *Rock Products*, which is an industry accepted source. In conducting the economic impact analysis, the Agency identified the same weaknesses discussed by the commenters related to the econometric estimation of cement cost functions by Das (1991 and 1992). Based on the best information available, EPA made adjustments to better reflect the operating costs of kilns by process type and capacity as well as account for recent improvements in labor productivity and changes in electricity consumption (as fully described in Appendix C of the EIA report, docket item II-A-46). Based on data from the Portland Cement Association, the Agency was able to account for variable cost differences across process types, i.e., wet, dry, dry-preheater, dry-precalciner. However, in accounting for economies of scale, the Agency was limited by the two capacity size classifications of less than and greater than 500,000 short tons per year for which labor productivity and fuel consumption are reported by the Portland Cement Association. Given time and resource constraints, the Agency was unable to account for industry's comments regarding the Das characterization of raw material and maintenance and repair costs.[6] Absent these revisions, the Agency acknowledges that its baseline operating costs were an overstatement of actual costs based on the available industry estimates and other sources as summarized in industry's comments. However, this overstatement would have caused the Agency to understate the baseline profits at

[6] However, the Agency completed these revisions to the economic model as it has been recently employed in estimating the economic impacts of the Cement Kiln Dust (CKD) rulemaking.

cement manufacturing plants and, thus, potentially lead to an overestimate of the likely kiln and plant closures associated with regulation.

The Agency also does not consider the industry's comparison of its projected average variable costs to actual costs for a small number of hazardous waste burning kilns as proof that the Agency's estimates fail to explain variation across kilns. As described above, the Agency utilized the best available information to account for cost variations related to process type, economies of scale, fuel use and efficiency (age), and labor and electricity productivity at cement kilns. The industry's sample of 16 hazardous waste burning kilns are not representative of the entire population of cement kilns. First, hazardous waste burning kilns represent a small portion of all cement kilns. In 1995, only 38 of the 203 operating cement kilns burned these wastes, or roughly 19 percent of all kilns. Second, their operations are not representative of most cement kilns because they burn hazardous waste, which relatively reduces the fuel component of costs and may increase other cost components such as electricity to operate additional auxiliary equipment. Furthermore, rather than using correlation coefficients and regression analysis, the Agency would have found a direct list comparison of EPA projected and actual cost for each kiln more helpful in evaluating the appropriateness of its baseline cost functions.

2. The production, investment, compliance, and closure decisions are firmly based on microeconomic theory. These decisions are modeled consistent with available literature related to the economic behavior of cement producers [For example, please see Das (1991), Das (1992), Capone and Elzinga (1987), McBride (1983), McBride (1981),

Norman(1979)]. In addition, these decisions are also consistent with the economic approaches employed by the Agency in addressing the economic impacts of environmental regulations on other industries. The Agency's model employs a short- and intermediate-run approach to estimating the economic impacts of the proposed NESHAP. It appropriately analyzes 1) the short-run decisions where kilns must at least cover variable costs to continue cement production, and 2) the intermediate-run where manufacturing plants account for "avoidable" costs in making their compliance decisions. The commenters have incorrectly interpreted that the Agency's economic model only utilizes the variable costs of the MACT standards to determine the production and investment responses by cement producers. The incremental costs of the MACT standards included the annual fixed capital and variable operating costs of compliance. The fixed capital costs are annualized based on the total capital investment costs using a 20-year equipment lifetime and 7 percent discount rate. The economic model imposes these annual costs on each kiln and based on conventional economic theory determines whether the kiln should continue to operate and the optimal level of cement production in response to these added regulatory costs.

The Agency does not believe that sufficient data are available to develop a dynamic model to evaluate longer run decisions. Projections of future prices and new suppliers would be difficult and introduce significant uncertainties. For example, the use of current market prices to inform operating and investment decisions by cement producers is more reasonable than projected future prices--especially since the 1993 market price is likely to be more representative of the average over the business cycle. If the Agency attempted to develop and utilize such a model,

then the industry comments regarding uncertainties of EPA's model data and assumptions outweighing the magnitude of impact results would be proper.

3. In conducting this economic analysis, the Agency employed a comparative static approach to evaluate the incremental impacts of a baseline scenario (or without regulation) and a with-regulation scenario. Because it is not a dynamic model, this comparative statics approach does not explicitly account for the cyclic nature of cement demand; however, these temporal aspects can be accounted for by assuring that the baseline conditions are reflective of a typical or representative operating year for the U.S. cement industry. The Agency believes that industry data demonstrate that the 1993 baseline year employed in its economic analysis is representative and does not bias the economic impact results. In fact, the recent industry trends of significantly increasing prices and stable production prices would support the use of a more typical year such as 1993 as a better counterfactual to measure the incremental impacts of the proposed NESHAP. The use of a more recent baseline year in which industry profits are higher than usual would tend to understate the impact results, especially plant and kiln closures.

4/5. The Agency based its selection of 20 regional markets for cement on the best information available. The geographic extent of each market was based on industry accepted limits to the "economic" transport of cement and company characterizations of the markets served by their manufacturing plants. These market description were provided in 10-K filings by Medusa Corporation, Southdown Inc., and Lone Star Cement Corporation. The Agency

acknowledges that the assignment of plants to one independent market does not perfectly characterize each and every ton of cement shipped in the United States. The industry's comments have pointed out a number of cases where cement plants could conceivably supply another market and, thus, compete across markets. However, the Agency characterized these markets based on the best available information to mitigate the potential for market spillovers and, thus, does not agree with the industry contention regarding the extent to which these market spillovers occur and are a factor that "significantly" biases the EPA's baseline characterization and economic impact results.

6. Please see response to Comment 4.3.2 part (2).

4.3.9 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that since the magnitudes of the uncertainties in EPA's market assumptions are often larger than the magnitude of the impacts (to be modeled), the model's results are within the "noise" of EPA's assumptions.

Response: The Agency has utilized the best available information in developing its economic model of the U.S. cement industry and to inform the regulatory process of the potential economic impacts. EPA is always confronted with uncertainties in developing economic models and has taken the necessary steps to best account for and, to the extent possible, reduce those uncertainties that are expected to be most influential in projecting the economic impacts of the proposed rule. The market characterization is based on industry's own definition of the geographic extent of cement markets and company-specific

descriptions of these regional markets. Given the transport limits for each plant's cement product, the overlap between regional markets does not influence the model baseline and outcomes as much as industry has indicated in its comments. The Agency believes that the commenters have overstated the magnitude of the uncertainties in its assumptions and that the results of the economic model are reasonable estimates of the regulation's impact on the industry and U.S. economy.

4.3.10 Comment: The cement industry faces many new environmental requirements with a large potential cumulative impact. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) support the development of a single economic model that can evaluate the cumulative impact of all the regulatory requirements together.

Response: The Agency concurs with these commenters and has since revised and adapted the economic model used for this NESHAP to evaluate the economic impacts of the HWC MACT standards that are currently being revised as well as the Cement Kiln Dust (CKD) rule that is scheduled to be proposed during 1999. By using a consistent economic approach and model, the Agency expects to be able to provide comparable impact results for each regulation affecting the U.S. cement industry.

4.3.11 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) suggested that EPA develop a simpler economic model that recognizes data limitations. They offer suggestions for such an approach on page 41 of Attachment G to docket item IV-D-26.

Response: The Agency acknowledges the industry's criticism of the economic approach, assumptions, and data. However, compared to other economic impact analyses, the Agency found the available data and information more than sufficient to develop the economic approach outlined in the EIA report (docket item

II-A-46) and to provide the necessary results to inform the regulatory development process.[7] Alternatively, the simple approach suggested by the industry is not sufficient to address the questions the Agency must address under the Clean Air Act, RFA and SBREFA, UMRA, and other legislative and administrative requirements. The simple approach is not based on an accepted paradigm similar to the microeconomic foundations of the Agency's approach and does not allow for estimation of market changes in price, output, foreign trade nor the associated social costs and their distribution across stakeholders. In fact, the basis of the simple approach is deemed much more subjective than the Agency's approach and its outcomes much less informative and much more sensitive to faulty assumptions or professional judgement. There is no scientific or firm basis for development of "impact thresholds" as suggested by industry to determine "the portion of the industry that is threatened with significant economic impacts from the regulation." For the Agency to meet its legislative and administrative requirements, it must go beyond these subjective characterizations of "significant impact" and provide quantitative measures of impact and their distribution within the U.S. cement industry and across all stakeholders, i.e., U.S. cement producers, foreign producers, and consumers. The Agency believes that it has employed the proper conceptual and analytical approach to determine these impacts and to the best of its ability acknowledged and accounted for the uncertainties related to its impact estimates.

4.4 Impacts: PM/HAP Metals

4.4.1 Comment: One commenter (IV-D-18) stated that EPA's

[7] In fact, in their examination of the relationship between price levels and seller concentration, Koller and Weiss (1989) comment about the "remarkable data" that are available for the U.S. cement industry.

computation of the total average HAP metal content of kiln exhaust PM is overstated by forty percent. The average metals concentration for the six sources listed in docket item II-B-36 is 0.6 percent, not 1 percent.

In addition, ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that docket item II-B-36, the basis of this factor, contains information for only five kilns. Since the source of the data was not identified, the commenters believe that the data are simply engineering estimates provided in the Information Collection Requests (ICRs). Such ICR data are not a sufficient basis upon which to estimate the metals content of particulate emissions. Thus, the estimated emission factor for HAP metals is erroneous.

Commenter (IV-D-18) further stated that EPA should reduce its estimate of HAP metal baseline emissions from 160 tons per year (TPY) to 96 TPY and emission reductions ascribed to the rule from 38 TPY to 23 TPY. The commenter also stated that the EPA should correct the impacts associated with PM control that are listed in docket item II-B-76. Correcting the HAP metal content in PM from 1 percent to 0.6 percent would increase EPA's estimated cost per ton of HAP metal controlled by 167 percent.

Response: Only data collected during short term testing with manual methods were available, and these data demonstrate a large range of metals concentrations in PM. There are no metals CEMs available to establish the fraction. The estimate of fraction of metals in PM that EPA used to estimate impacts is within the range of metals content obtained from different databases.

The purpose of estimating HAP metal content of PM is to estimate HAP metal emissions and reductions on a national basis, and not to develop emission factors to be used on a site-specific basis. Furthermore, the HAP metal content does not affect the

decision to have an emission standard for PM. The HAP metals are present and have been measured in kiln exhaust PM and CKD. Controlling PM controls HAP metal emissions. Therefore an emission standard has been established on the basis of the MACT floor technology. Each facility has to determine if they are a major source of HAPs, and should make their own measurements of HAP metal content of PM rather than assuming the average reported by EPA.

4.4.2 Comment: Comments on compliance costs follow.

1. According to one commenter (IV-D-18), the cost for the data acquisition system and software for monitoring opacity will exceed the cost of the opacity monitoring equipment.

Response: This comment was made in the context of combining data produced by the COM to yield averages for different length time periods and calculation of block and rolling averages, along with procedures for handling periods during calibrations and times when data were missing due to monitor malfunctions. The commenter did not provide any cost data to support the claim being made.

The EPA intends that actions to deal with problems associated with monitor malfunction and instrument calibration for affected sources be addressed in the written operations and maintenance plan under section 63.1350(a). Estimated costs associated with the recordkeeping and reporting requirements of these rules were included in the burden costs under the Paperwork Reduction Act section of the proposal preamble, and have been updated for the final rule.

2. One commenter (IV-D-20) asked if the costs for installing or upgrading particulate matter control devices to achieve the required PM control were factored into the estimated cost of compliance for this

NESHAP.

Response: The estimated costs to upgrade PM control devices to achieve the required level of control were included in the capital and annualized costs estimates for the proposed regulation.

3. One commenter (IV-D-23) questioned the EPA cost estimates and believes that EPA underestimated the cost of the rule since costs were not included for the following.
   a. installing and operating PM CEMS
   b. installing stacks
   c. installing COMs
   d. purchasing data acquisition and recording systems.

Response: The final rule does include a requirement to install PM CEMS (although the required date for installation is deferred), and the costs for these systems have been included in the capital and operating cost estimates that were revised for the final rule. See docket items IV-B-8 and IV-B-9. With respect to installing stacks, the proposed and final rules provide options for opacity monitoring that do not require the installation of stacks. Therefore the costs of installing stacks have not been included in the capital and operating cost estimates for existing facilities. No costs were estimated for new kilns to install stacks since they would already be required to meet the NSPS.

The costs of installing and operating COMs were included in the capital and operating cost estimates. The purchase of data acquisition and recording systems (DAS) was not factored into the COM costs at proposal. However, EPA revised the estimated costs of the NESHAP to include DAS and estimates that DAS would insignificantly increase nationwide annual costs by 0.07 percent (docket item IV-B-7, IV-B-8, and IV-B-9.

4. One commenter (IV-D-20) stated that emission reduction measures include the "enclosing of systems."

   a. Have these costs been included in the cost estimates?

   b. Have the number of plant situations which require this been determined or estimated?

   c. What are the required engineering details and monitoring procedures for the enclosures (i.e., no open doors, vents, etc., no visual emissions)?

Response: The EPA did not include costs associated with upgrading equipment used to control emissions from materials handling affected sources, as these affected sources have been subject to the NSPS for many years (a longer period than the expected life of these affected sources), and compliance with the NESHAP, which is equivalent to the NSPS for these affected sources, would not impose additional costs.

5. The proposed NESHAP for HAP metal emissions from the kiln, clinker cooler, and materials-handling activities are identical to the NSPS. One commenter (IV-D-15) questioned how the requirements to perform initial particulate matter (PM) tests on the kiln and clinker cooler, add a continuous opacity monitor to the cooler stack, and perform visual monitoring of the material-handling activities will result in any further PM reduction at plants that already meet the NSPS. Under the proposed NESHAP, the best performing plants (that already meet the NSPS) would be required to spend money to achieve no HAP reductions. At these plants, the cost per unit of pollutant reduced would be infinite!

Response: The basic response to this question was provided in Section 2.2.1 of this document where the commenter suggested that

existing facilities that already comply with the NSPS need not be subject to the NESHAP and incur additional costs. Additional cost elements include performance testing and monitoring. Under the rule, performance testing for PM is required initially and then once every five years. This is not an overly burdensome requirement. Such periodic testing and monitoring is required to ensure continuous compliance. While no additional HAP reductions are achieved, the testing and monitoring ensure that the reductions are maintained continuously.

6. One commenter (IV-D-18) stated that EPA assumes that no additional control costs will be incurred for new sources in using COMs for compliance purposes but overlooks the fact that the proposed regulation significantly changes the effective opacity monitoring limits and attendant requirements. The proposed corrective action plan and quality improvement plan (QIP) triggers are fifteen percent opacity level based on ten consecutive thirty minute averages, and five percent of the thirty-minute period during any six-month reporting period, respectively. By contrast, the existing NSPS opacity standard is 20 percent for six-minute periods. The proposed significant changes will lead to increased costs for: the development of corrective action plans (and QIPs, if applicable), improved particulate control efficiency (so compliance will be met under all conditions at all times), COM data acquisition systems to track and compare data to corrective action and QIP triggers, quality assurance programs for COMs, and data storage.

Response: The proposed and final rules do not change the opacity limit for kilns and clinker coolers as compared to the NSPS. The final rule has been changed since proposal in that it

does not have the corrective action and QIP triggers for opacity.

7. As discussed in Attachment C[8] to docket item IV-D-26, monitoring *de minimis* sources will provide negligible environmental benefits at high cost. (In Attachment C, the commenters estimate annual monitoring/record keeping costs (for *de minimis* sources) for the industry to range from 7.3 million to 33.5 million dollars per year).

Response: The commenter is referring to costs associated with monitoring visible emissions for sources such as clinker handling and storage, raw material storage and blending, and cement storage. The costs as estimated by the commenter include labor to make observations and receive training. The EPA concludes that the commenter has overestimated the costs per observation by a factor of two or more by including training costs for observers on three shifts when visual observations can only be done on 1 or 1.5 shifts. In addition they have been overestimated by including extended periods for reaching observation locations when many locations will be in close proximity to one another, and extended time periods to record observations. Note, however, that costs of additional monitoring of materials handling operations were included in the revised EIA and national cost estimates prepared following proposal. See Appendix G of EIA and docket item IV-B-8.

Furthermore, section 112 of the Clean Air Act provides no exceptions from emission standards or monitoring based on *de minimis* levels of HAP for major sources, or area sources that have been listed under 112(c)(6). Monitoring is required to be sure that those sources that the commenter labels as *"de minimis"*

[8]Analyses of Selected Issues Contained in Proposed Portland Cement Manufacturing NESHAP, prepared by Penta Engineering Corporation, June 1998.

remain *de minimis* between performance tests. (See section 114(a)(3) requiring enhanced monitoring for compliance certifications from major sources and encouraging it for other sources.)

4.4.3 Comment: Comments on the impacts of using PM CEMS are noted below.

1. One commenter stated that EPA should justify costs (for calibration, operation, and maintenance) of PM CEMS in terms of environmental benefit relative to other monitoring alternatives before expressing its intent to require PM CEM monitoring. The EPA must provide affected parties a legitimate opportunity to participate in such a rulemaking effort in a meaningful way.

Response: EPA has conducted a new EIA and small business impacts analysis, and has re-estimated the national cost impacts to include the cost of PM CEMs for this final rulemaking. See docket items IV-B-8 and IV-B-9. Although PM CEMs are required as part of this rulemaking, the installation date for the PM CEMs is being deferred until a future rulemaking. EPA will reassess, as appropriate, impacts in that future proposed rulemaking that will establish the date that PM CEMs must be installed on NHW cement kilns. The EPA has provided, and will continue to provide, affected parties the opportunity to provide input to EPA in its development of this NESHAP. In particular, EPA will provide opportunity for comment at the time of the proposal establishing the date that PM CEMs are required to be installed.

2. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA will need to reevaluate the analysis if EPA intends to require NHW cement kilns to use PM CEMS, according to Executive Order (EO) 12866, 58 FR 51735

(October 4, 1993). The current analysis does not include costs associated with PM CEMS. If those costs are included, which the commenters estimate will be considerable given the lack of experience in the U.S. with PM CEMS, the portland cement manufacturing NESHAP would trigger the regulatory impact analysis mandate of EO 12866.

Response: As noted in the previous response, EPA has reconducted its EIA and small business impacts analysis, and re-estimated national cost impacts to include the cost of PM CEMs. The EO 12866 mandates that a regulatory impacts analysis (RIA) be conducted if total national annual costs exceed 100 million dollars. Based on its revised national cost impacts analysis to include PM CEMs and other additional monitoring requirements, the EPA estimates that the national annual cost of the rule to be $37 million. See docket item IV-B-9. Therefore an RIA is not required. In any event, EPA will reassess, as appropriate, cost impacts in that future proposed rulemaking that will establish the date that PM CEMs must be installed on NHW cement kilns.

4.4.4 Comment: One commenter (IV-D-20) stated that EPA estimated HAP metal emissions using a factor of 0.03 gr/dscf (that is the average of two values, 0.045 gr/dscf for kilns controlled by an electrostatic precipitator (ESP) and 0.014 gr/dscf for kilns controlled by a fabric filter (FF). The commenter stated that unless the clinker tonnage produced by kilns using ESPs was equal to that produced by kilns using FFs, the number was potentially inaccurate.

The commenter also noted in docket item II-B-62 of page 7 that the New Source Performance Standard (NSPS) PM limit of 0.3 lb/ton dry feed corresponds to 0.039 gr/dscf for wet, dry, and PH/PC kilns. The commenter stated that the combined NHW and HW kiln PM emission data produce an average PM emission of 0.042

gr/dscf for ESP controlled units and 0.025 gr/dscf for FF

controlled units. Averaging these two values would give 0.034 gr/dscf vs 0.03 gr/dscf (that was used in the MACT rule).

Response: Docket item II-B-55 shows annual clinker production totals of 34.4 million tons for kilns with ESPs and 36.2 million tons for kilns with FFs. Weighting the average grain loadings for these APCDs by clinker production gives an average weighted grain loading of 0.028 gr/dscf. Thus, the 0.03 gr/dscf factor that was used to estimate nationwide baseline PM and HAP metal emissions is acceptable.

Page 7 of docket item II-B-62 states that the NSPS limit of 0.3 lb/ton dry feed corresponds to a stack gas concentration of about 0.030 gr/dscf for wet and dry kilns and to 0.039 gr/dscf for preheater and precalciner kilns. These grain loadings were used to estimate nationwide emission reductions based on model kiln calculations.

The commenter notes that interpreting the available data in different ways leads to different grain loadings (from 0.28 to 0.34 gr/dscf) but these do not significantly differ. Thus, there is no need to revise the estimated baseline emissions and emission reductions.

4.4.5 Comment: One commenter (IV-D-33) stated that actual PM and HAP reductions will be lower than EPA's projections, despite the existence of available technology. The commenter does not want to see a limit that forces affected sources to go out of business, but the proposed PM limit will cause "adverse impacts" (e.g., higher HAP emissions than would result under a lower limit). The EPA can propose tighter PM limits (than those based on MACT) to achieve the CAA purpose to control HAP emissions cost-effectively.

Response: The commenter provided no data or rationale to

substantiate the claim that actual PM reductions will be less than EPA's estimates, nor did the commenter provide data indicating the PM limit will cause adverse impacts. Assuming the commenter meant that EPA could propose emission limits tighter than the MACT floor (the commenter said that EPA could propose emission limits tighter than *MACT*), EPA may set emission limits more stringent than the MACT floor, but as was stated in the preamble for the proposed rule, no beyond-the-floor technology has been shown to consistently achieve lower emissions than the MACT floor. (See response to comment 5.2.4.3 in section 5. for a discussion of the selection of the MACT floors.) Further, the MACT floor selection and emission standard is technology based. Adverse impact avoidance is not, and cannot be, the basis for the selection. Section 112(f)(2) of the Clean Air Act provides that all source categories for which MACT standards are promulgated be assessed for residual risks to public health, and standards promulgated within 8 years for those source categories where necessary to provide an ample margin of safety to protect public health.

4.5 Impacts: D/F

4.5.1 Comment: One commenter (IV-D-16) questioned why EPA evaluated only activated carbon injection as a beyond-the-floor dioxin control technique. In September 1995, the State of New York recommended that EPA evaluate the injection of chemical additives into the air pollution control system as a beyond-the-floor dioxin control strategy. This strategy is already used in Europe at municipal waste incinerators. There is no explanation of why EPA did not pursue the New York recommendation. The EPA should evaluate beyond-the-floor options other than activated carbon injection to determine whether further dioxin emission reductions can be achieved in a cost effective manner.

Response: The EPA investigated the demonstrated and available technologies in considering going beyond-the-floor to establish emission limits for D/F. Evaluation of injection of chemical additives to reduce D/F emissions may have merit as a research program, but it is not a demonstrated and available technology for the cement industry. The commenter provided no data for evaluation.

4.5.2 Comment: One commenter (IV-D-20) stated that EPA should revise its estimate of dioxin/furan emissions from NHW kilns, since EPA's estimate was based on data that included emissions for the Calaveras Redding kiln. The Calaveras Redding data should not be used because of field blank contamination that makes the data "worst case."

Response: Page 12 of the test report (docket item II-D-119) states that high levels of octa-dioxin, octa-furan, and 1,2,3,4,6,7,8-hepta-furan congeners were reported in the field blank, but the actual sample blank analysis was not included. Page 12 states that the dioxin/furan values for these congeners may be biased high and should be regarded as the upper limits to the true concentrations. Since (1) there were no reported problems with the other congener data, and (2) the TEQ factors for the suspect congeners are low (0.001 for the octa congeners and 0.01 for the hepta congeners) and would tend to reduce any high bias, EPA used all of the Calaveras data and did not discard it.

4.5.3 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) urge EPA to not exercise its authority to regulate dioxin/furan emissions from portland cement area sources (per section 112(c)(6)) under MACT or GACT standards, since such requirements would impose significant reporting, recordkeeping, monitoring, and control technology burden on area sources for *de minimis*

environmental benefits. In addition, the costs per unit of dioxin/furan removed for area sources are likely to exceed the costs for major sources, further adding to the burden on area sources.

Response: The issues related to regulation of area sources under section 112(c)(6), MACT or GACT, burdens of reporting, recordkeeping, and monitoring, and *de minimis* environmental benefits were addressed in Section 2.3.2 - 2.3.5 of this document. The commenter's claim that area sources will be more severely impacted than major sources is misplaced, since major source status is dependant on emisson levels of HAPs such as HCl and organic HAPs, and not on the number of people employed by the company. In any event, control costs for D/F emissions from small kilns were evaluated as part of the overall control cost development activity, and those costs were provided as inputs to the economic analyses conducted in support of this rulemaking. Extensive explanations of the economic analyses performed for small sources are provided in Section 4.3 of this document. The burdens on small businesses sources have been considered in the development of this rule.

4.5.4 Comment: One commenter (IV-G-6) stated that EPA's SBREFA Guidance supports excluding area sources from the proposed dioxin/furan regulation in that the guidance:

1. directs program offices to "minimize any impact to the extent feasible, regardless of the size of the impact or the number of small entities affected."
2. declares that "it may be appropriate for EPA to provide regulatory flexibility or relief to small-volume polluters on general policy grounds" whether or not such sources are also "small entities."

Response: See Section 2.3.2 - 2.3.5 of this document. The EPA is required by section 112(c)(6) to "list categories and

subcategories of sources assuring that sources accounting for not less than 90 per centum of the aggregate emissions of each such pollutant are subject to standards under subsection (d)(2) or (d)(4) of this section." The method for identifying and selecting sources for listing and regulation under these subsections was discussed at length in Federal Register notices published on June 20, 1997 (62 FR 33625) and April 10, 1998 (63 FR 17838). Section 112(c)(6) does not provide for de minimis exemptions for source categories, but rather directs EPA to make findings on the basis of what is necessary to meet the requirement to assure that sources accounting for 90% of the emissions of these pollutants were subject to standards. Moreover, because the pollutants addressed by section 112(c)(6) are persistent, that is, they remain in the environment for extremely long periods of time without breaking down, the EPA believes that any claims of de minimis contributions should be considered with great caution, and granted in only very exceptional circumstances. Consequently, the EPA believes that its decisions in response to section 112(c)(6) represent a reasonable exercise of its discretion within the constraints of that subsection.

The SBREFA Guidance deals with small businesses, not area sources. The determination as to whether a source is a major source or area source is related to the quantity of HAP emissions, in this case metals, organics, HCl, and other pollutants; and not the number of employees. A small business may operate a kiln that emits major source quantities of HAP.

4.5.5 Comment: One commenter (IV-G-6) stated that the dioxin/furan limit is the most expensive requirement EPA has proposed for portland cement manufacturers and may require sources to install gas cooling or "quench" towers to maintain proper temperatures. Based on cost per unit of dioxin removed,

this is precisely the type of requirement that could impact area sources much more significantly than major sources.

Response: In generating the estimates of nationwide costs for compliance, the EPA has included the cost of technology to reduce gas stream temperatures at some plants to achieve D/F control. Some of the plants impacted by these costs are expected to be area sources. The reduction of D/F emissions may be small relative to other pollutants, however, dioxin is an extremely potent carcinogen. Waste gas temperature reduction at the inlet to the PM control device has been determined to be the floor technology for D/F emissions control. Cost effectiveness is not a consideration at the floor level of control. Further, portland cement plants' status as either major or area sources of HAPs is dependant on the emissions levels of HAPs, most likely HCl and/or organic HAPs originating from feed materials, and not necessarily on the size of the company. See the response to comment 4.5.3.

4.6 Impacts: THC/Organic HAPs

4.6.1 Comment: One commenter (IV-D-16) noted that sources that are located near raw materials that yield lower THC emissions may enjoy a competitive advantage over sources that are not, but all sources are capable of purchasing low THC feed. The EPA's claim that some existing sources cannot use the feed material selection and feed material blending because they are tied economically to raw material sources in close proximity does not render such measures unachievable. The EPA has not conducted any economic analyses regarding the cost of performing improved feed selection particularly where the THC originates in substantial part from the use of certain wastes as fuels.

Response: This comment refers to the discussion on selection of MACT floor technology for THC emissions; see section 5.4 of this document. The proposal preamble addressed consideration of feed material selection for existing sources as a MACT floor

technology and concluded that there is no MACT floor for existing kilns, one reason being that facilities are generally tied to existing raw material sources in close proximity to the facility, and that raw material proximity (i.e., transportation cost) is usually a major factor in plant site selection. This conclusion was supported by several commenters. The commenters described the economic difficulties in locating, purchasing, and transporting low organic feed materials to existing sites. Selection of clean feed material is also not available to new brownfield sources for the same reasons given for existing sources. However, for new "greenfield" kilns, feed material selection as achieved through appropriate site selection and feed material blending is considered new source MACT.

Regarding the comment that THC originates from waste fuels, the commenter provided no data that show changes in waste fuel burning practice reduces THC emissions from NHW kilns. However, the commenter may be referring to the THC standards for kilns which burn hazardous waste, which were established to ensure efficient combustion of the hazardous waste fuel.

As explained in the proposal preamble, two kilns using feed material with high organic content chose to install a precalciner kiln design with no preheater. The EPA evaluated this technology, but for the reasons cited in the proposal preamble, including estimated higher fuel consumption of 79 percent and higher sulfur dioxide, nitrogen oxides, and carbon dioxide emissions relative to a preheater/precalciner design, concluded the design did not represent the MACT floor for new sources or an acceptable beyond-the-floor technology for existing sources.

4.6.2 Comment: One commenter (IV-D-20) stated that Table 5, which provides estimated emission reductions, does not seem reasonable especially for THC and organic HAPs. What is the basis for the THC and HAPs emissions on new kilns?

Another commenter (IV-D-28) believes that the projected total hydrocarbon emission reductions are greatly overestimated. Because the hydrocarbon limit applies only to new sources, and because probably very few new sources will be constructed, hydrocarbon reductions are not likely to be achieved.

Response: The baseline emissions referred to by the commenter (IV-D-20) were in Table 6 rather than Table 5 of the preamble. Page 5 of docket item II-B-77 provides the calculation basis for the emission reduction estimates contained in the preamble. Five new kilns are expected to be constructed within five years from promulgation of the standards each with an average capacity of 650,000 tons of clinker per year. Based on data in docket item II-B-76, the average waste gas stream content of THC for these new kilns was estimated at 35 ppm. In the same docket item the percentage of organic HAPs present in THC was estimated to be 23 percent. National baseline THC emissions for new kilns were estimated as follows:

(35 parts THC as propane/1,000,000 volume stack gas) x (54,000 dscf/ton dry feed) x (1.65 ton dry feed/ton clinker) x (650,000 ton clinker/year) x (1 lb•mole propane/385.5 ft^3) x (44 lb propane/lb•mole) x (1 ton/2,000 lb) x (5 new kilns)
= 578 tons THC as propane/year.

578 tons THC/year x 0.23 = 133 tons organic HAP/year.

These numbers were rounded to baseline emissions of 580 ton/year THC and 130 ton/year organic HAP.

4.6.3 Comment: One commenter (IV-D-20) stated that EPA assumed that there were "no control cost impacts" for THC emission control. However, plants will have laboratory costs for identifying raw materials with low kerogen content and could have

costs for purchasing raw materials with lower kerogen content.

Response: The final rule requires only new greenfield facilities to meet the THC emission standard. In the case of a new greenfield facility, the kerogen content of raw materials will be only one factor among many for which raw materials are analyzed in the process of finding suitable raw material sources. Many analyses will be conducted to ensure that the raw materials possess chemical properties consistent with a clinker product within specifications. The EPA expects that laboratory costs for the kerogen analyses will be an insignificant component of the overall raw material selection process. For a new greenfield facility, the cost of transporting raw materials will be a factor in the site selection process. A greenfield location will be selected that will yield an economically viable business, i.e., near suitable raw materials. There is no baseline against which EPA can estimate a premium cost for lower kerogen content raw materials. However, many NHW facilities already in operation are sited in locations with low kerogen content raw materials and are financially viable. It is expected that greenfield plants will be sited such that raw materials will not have to be purchased from off-site.

4.6.4 Comment: One commenter (IV-D-20) noted that EPA assumed that new kilns would only purchase one THC CEM. However, in order to "demonstrate continuous compliance with the THC emission standard," two THC CEMs would have to be installed for the time when one CEM is out of service.

Response: The final rule will clarify the data availablity requirements, i.e., valid CEM data must be obtained in accordance with Performance Specification 8A.

4.6.5 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that the THC standard for reconstructed kilns (based on

raw material feed selection) would be particularly burdensome.

Response: The EPA agrees with this comment. The final rule does not require reconstructed sources to meet the THC emission standard.

4.7 Impacts: Hg

4.7.1 Comment: One commenter (IV-D-16) noted that mercury feed limits and/or fuel switching are also potential beyond-the-floor controls which were not evaluated by EPA. The cost of fuel switching may be far less than using activated carbon injection to achieve comparable mercury reductions.

Response: The EPA has no data indicating that feed and/or fossil-fuel switching or cleaning has been undertaken by any NHW kilns to reduce mercury emissions, and therefore these are not MACT floor options. EPA agrees with the commenter that feed limits and/or fossil-fuel switching is a beyond the floor option, but the EPA does not have data, nor did commenters provide data, that show that this option would consistently decrease mercury emissions. The proposed rule for Hazardous Waste Combustors included a standard of mercury, however, control of mercury in that case was based on controlling the amount of mercury in the hazardous waste fuel. This approach is not available to NHW kilns. Based on the Electric Utility Report to Congress on HAP emissions, EPA believes that fuel switching among different coals and from coal to oil would not consistently reduce HAP metal emissions from cement manufacturing plants. Therefore, a mercury limit has not been added to the final rule. (Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units - Final Report to Congress, volume 1, 453/R-98-004a, February 1998, pp. 13-1 through 13-5.) However, EPA will be performing research and development work with the objective of finding more cost effective methods to reduce mercury air emissions from fossil-fuel fired electric utilities, and EPA will

in the future consider whether any more cost effective methods may be appropriate as a basis for reducing mercury emissions from NHW cement kilns.

4.7.2 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that the costs for installing carbon injection downstream of the kiln APCD are greater than treating gases upstream of the kiln APCD. However, the downstream approach does not present the same set of negative potential environmental consequences. EPA's estimated cost effectiveness of installing carbon injection downstream of the APCD range from 20 million to 50 million dollars per ton of mercury removed. The commenters agree with EPA that such costs cannot be justified for new, reconstructed, or existing kilns.

Response: The EPA acknowledges this comment and has considered it in the final rulemaking decisions.

4.8 Impacts: HCl

4.8.1 Comment: Eleven commenters (IV-D-18, IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that validating Method 26 testing with Methods 321 and 322 will add a factor of 2 to 4 to the costs for each HCl emissions test.

Response: In the final rule, Method 26 may be used without the concurrent use of, and validation with, Methods 320 or 321, but only to confirm the source is a major source. Only Methods 320 or 321 can be used to measure HCl emissions in making a claim that the source is an area source. See the response to comment 2.5 in section 2. for a discussion of HCl test methods. Therefore these supposed additional costs do not apply if the source claims it is a major source.

4.8.2 Comment: Commenter (IV-D-18) noted that monitoring is a category of compliance cost that EPA has committed to

examine in order to mitigate the potential adverse impacts on small businesses (per the undated document "U.S. EPA, Guidance on Mitigation of Impacts to Small Business while Implementing Air Quality Standards and Regulations," pg. 3). Consistent with the June 10, 1998 letter from EPA to the American Portland Cement Alliance (docket item IV-C-15), in which EPA pledged to "continue to work with small business to determine whether there are opportunities for minimizing any adverse impact," the Agency should revisit its decision on Method 26 sampling.

Response: See the response to comment 4.8.1. Sources may use Method 26 without the concurrent use of Methods 320 or 321, but only to confirm the source is a major source. See also the response to comment 2.5 in section 2. for a discussion of HCl test methods.

4.8.3 Comment: One commenter (IV-D-23) stated the EPA overestimated hydrogen chloride emissions partly because hydrogen chloride is converted to other chloride salts upon leaving the stack and does not impact the environment as hydrogen chloride.

Response: The estimates of HCl emissions and HCl emission reductions impacts are based on measurements in the stack and not on its form after atmospheric reactions.

5. SELECTION OF EMISSION LIMITS

5.1 Selection of Emission Limits: General

5.1.1 Comment: One commenter (IV-D-16) stated that according to section 112(d) EPA may not base the floors of its

emissions standards on a particular technology. Instead, emissions standards for existing sources must be no less stringent than "the average emission limitation achieved by the best performing twelve percent of the existing sources" (for which EPA has data). For new sources, standards must be based on the emission control that is achieved in practice by the best controlled similar source. Thus, the standards proposed for emissions of dioxins, mercury, total hydrocarbons, and hydrogen chloride are not valid.

One commenter (IV-D-16) also stated that EPA's proposed rule would violate the Clean Air Act since it does not contain numerical emission limits for pollutants (such as mercury, cadmium, and lead) that are enumerated in section 129.

Response: First, it should be noted most of the commenter's points were recently rejected by the D.C. Circuit in Sierra Club v. EPA (March 2, 1999). That case holds that because MACT standards must be achievable in practice, EPA must assure that the standards are achievable "under most adverse circumstances which can reasonably be expected to recur" (assuming proper design and operation of control technology). Slip op. p. 13. The case further holds that EPA can reasonably interpret the MACT floor methodology language so long as the Agency's methodology in a particular rule allows it to "make a reasonable estimate of the performance of the top 12 percent of units", slip op. p. 7; that evaluating how a given MACT technology performs is a permissible means of estimating this performance, id. at 13; and that new source standards need not be based on performance of a single source, id.

Second, it should be noted that the commenter provided no additional emissions data for any pollutant. The EPA has selected emission limits at the floor level of control. Section 112(d) requires EPA to promulgate emission standards based on

what is determined to be achievable through the application of techniques, methods, etc. The rule does not require the use of any specific technology to meet the emission standard. The emission standards are based on the emissions levels achieved through the application of MACT floor technologies and account for variation in the process and in the air pollution control device effectiveness.

Although the commenter did not specifically mention PM, the following discussion using PM as an example will help clarify EPA's approach in setting MACT standards for this source category. The EPA evaluated the PM MACT floor technology for both existing and new sources at proposal and determined that the MACT floor technology is properly designed and operated FFs and ESPs. Commenters provided no data to suggest that a particular design or operating mode, or an alternative technology could achieve a lower level of PM emissions on a consistent basis. Nor did EPA identify other technologies for existing or new kilns or in-line kiln/raw mills that would consistently achieve lower emission levels of PM than the NSPS limit.

As discussed in docket item number IV-B-10, (addresses PM emissions variability, etc.), the data upon which the MACT floor was based were obtained from EPA Method 5 compliance tests on kilns subject to the NSPS and represent performance of PM control devices (PMCDs) associated with new kilns over a relatively short period (typically three 1-hour test runs). These test data were obtained at kilns equipped with well designed and operated ESPs and FFs representative of the MACT floor, which is also represented by the NSPS emission level. Method 5 testing of these cement kilns equipped with MACT floor technology showed a range of emissions up to the NSPS level. Additional Method 5 tests performed on some of the same kilns included in the MACT floor analysis showed PM variations after control as plotted in the reference. The EPA believes that the database -- which shows

cement kilns with properly designed and operated fabric filters and electrostatic precipitators achieving levels up to and including the NSPS level -- adequately accounts for the variability inherent in the air pollution control technologies, and indicates what PM levels are consistently achievable in practice. (See Sierra Club, slip op. p. 13.) In summary, the PM emission limit reflects an emission level consistently achievable with the use of well designed and operated MACT floor technology.

The emission standard for dioxin is based on the emission level achievable through the application of the MACT floor control technology, which is exhaust gas temperature control at the inlet to the PM control device to less than 400° F, and efficient combustion. Based on data evaluated at proposal, the technology can be represented by the dual standard of 0.2 ng TEQ/dscm or 0.4 ng TEQ/dscm with a PM control device inlet temperature of 400° F or less. Since the commenter provided no additional data, the EPA has reviewed, in response to this comment, the existing test data and literature on D/F formation and concluded that the selected emission limits are consistently achievable and represent the MACT floor. Similar to the discussion above regarding the PM data, the D/F performance test data are based on short-term tests of facilities using the MACT floor technology. Thus the proposed emission limits are retained and account for normal, inherent process and air pollution control operating variability, including the use of various fuels.

As discussed in the proposal preamble, there are no standards for THC emissions from existing sources because the MACT floor for control of THC for existing sources is no control. Further, the BTF control technique for existing sources, and a floor control for new sources, would be based on the performance of the precalciner/no preheater technology. However, as discussed in the proposal, EPA rejected this technology as a

basis for setting THC emission limits because of the technology's negative environmental and energy impacts. The basis for the THC limit for new greenfield kilns is site selection to ensure low hydrocarbon content in feed materials. (In the proposal, the THC limit applied to all new kilns, but based on comments received, the rule has been changed such that the THC limit will only apply to new greenfield kilns, in-line kiln raw mills, and raw material dryers.) As discussed in the proposal, this option is not practically available to existing (and new brownfield) kilns, in that facilities are generally tied to existing raw material sources in close proximity to the facility, so that raw material proximity (i.e., transportation cost) is usually a major (indeed, critical) factor in plant site selection. Thus, use of raw alternative raw feedstocks is not an appropriate beyond the floor technology for existing or new brownfield kilns, because it is cost prohibitive.

As discussed in the proposal preamble, no standards are being adopted for Hg and HCl because the MACT floor has been determined to be no control and the BTF controls were not cost effective (docket item II-B-67).

This standard was developed under section 112, not section 129, so there is no statutory requirement to establish standards for individual HAP metals. However, control of cadmium, lead, and other non-volatile and semi-volatile metal HAPs is achieved via the floor level-based emission limit for PM, which serves as a surrogate for the non-volatile and semi-volatile metals. This is supported by data from coal-fired electric utility boilers which show relatively high HAP metals (except mercury) removal with fabric filters and electrostatic precipitators (the technology on whose performance the standard for PM is based.) (Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units - Final Report to Congress, volume 1, 453/R-98-004a, February 1998, p. 13-23 and 13-26).

Furthermore, sufficient data do not exist to identify emission limits for lead and/or cadmium associated with MACT and EPA is unable to establish emission limits for these pollutants in this rule. See Sierra Club v. EPA, no. 97-1686 (D.C. Cir. 1999) slip op. at 15 (EPA is not obliged to establish a MACT standard for HAPs for which the Agency is unable to quantify emission reductions). Even if such emission limits could be developed, however, they would not result in any further reduction in emissions beyond that achieved by the MACT rule, given the PM standard.

5.1.2 Comment: One commenter (IV-D-23) stated that the APCA reviewed EPA's emissions data and claims that EPA incorrectly estimated the content of metals in PM and organic HAPs in THC. The commenter requested this to be corrected in the final rule. The commenter requested that EPA compare the APCA-reviewed emissions data (in Attachment B[9] to docket item IV-D-26, which is also docket item II-D-195), and EPA's data and revise the estimates accordingly.

Response: EPA's only purpose for estimating HAP metal content of PM is to estimate HAP metal emissions and reductions on a national basis. The EPA reviewed and considered the emissions data summary provided in docket item II-D-195, as well as other information available to the Administrator and included in the docket (II-B- 62). Only data collected during short term testing with manual methods were available, and these data demonstrate a large range of metals concentrations in PM. There are no metals CEMs available to establish the fraction on a long-term basis. The EPA selected a fraction from within the range of fractions obtained from different databases to estimate impacts.

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[9] Attachment B: Compilation of Cement Industry Air Emissions Data for 1989 to 1996, prepared by Air Control Techniques, P.C., September 1996.

The EPA acknowledges the variability of the data on stack emissions of organic HAPs and THC, and used the 23 percent value for estimating national baseline emissions and emissions reductions. The 23 percent value was not developed to be used as a site-specific emission factor in lieu of source emissions testing.

5.1.3 Comment: One commenter (IV-D-27) does not support the concept of using surrogate tests to substitute for individual metal HAPs and volatile HAPs and strongly objects to the use of opacity as a surrogate for PM concentrations. The rule should require periodic or routine stack tests for specific metals, mercury, hydrogen chloride, and specific volatile HAPs since it will be impossible for EPA to evaluate the residual risks from portland cement manufacturing without these data.

Response: The EPA is not promulgating emission standards for HCl, Hg, specific metals, or specific organic HAPs (other than D/F) at this time, so testing for these pollutants is not required for compliance determination. However, testing of some of these pollutants will be required of sources that wish to claim that are not major sources of HAP. Also, data have been collected for these pollutants, as well as for other HAP metals, during development of these rules. Using PM as a surrogate for specific HAP metals eliminates the cost of performance testing to comply with numerous standards for individual metals, and achieves exactly the same level of HAP metal emissions limitation, since the control for non-volatile and semi-volatile metals is PM control. Opacity is used as a separately enforceable emission limit that can be continuously measured with COMs, and it is an indicator of the need for PMCD maintenance. Residual risk calculations will be made at a later date based on data available at that time. See additional responses to comments in this chapter regarding the use of surrogates.

5.1.4 Comment: One commenter (IV-D-28) was disappointed to discover that there are no standards for mercury and hydrogen chloride and that the proposed rule merely retained the same standards for PM that are contained in the New Source Performance Standards.

Response: The MACT floor for Hg and HCl is no control (docket item II-C-94 p. 3-24). The BTF controls were not cost effective (docket item II-B-78). The EPA did not identify any new PM control techniques more effective than well designed and well operated fabric filters and ESPs (docket item II-C-94 p. 3-2 through 3-7). See response to comment 5.1.1.

5.1.5 Comment: One commenter (IV-D-33) noted that EPA's proposal lags behind the efforts of other industrialized countries in controlling emissions from cement kilns. The commenter claimed to have enclosed the British standard for cement plants (that also discusses available control options), but the docket office did not receive the document.

Response: Each emission limit corresponds to the MACT floor level of control based on data available to the Administrator, and determined as required under the Clean Air Act section 112. No additional data or information was supplied by the commenter.

5.1.6 Comment: One commenter (IV-G-3) supports EPA's decision not to adopt controls beyond-the-floor, as these costly options would dramatically impact the viability of cement production operations.

Response: The EPA acknowledges this comment. No additional data or information was supplied by the commenter.

5.2 Selection of Emission Limits: PM/HAP Metals

5.2.1 Comment: One commenter (IV-D-20) asked what is technically achievable vs. operationally efficient when installing or upgrading particulate matter control devices (PMCDs) to achieve the required PM control.

Response: The point of this comment is not clear. However, the floor level of particulate matter control is technically achievable through the use of fabric filters and electrostatic precipitators, as is demonstrated by many existing facilities. The commenter did not define operationally efficient.

5.2.2 Comment: One commenter (IV-D-20) asked how the best performing plants were determined. Does that determination follow Clean Air Act procedures for determining the best performing plants?

Response: The EPA ranked the best twelve percent of available emissions data, examined the design of currently available control devices within the ranking, and considered the variability of the process and the control devices. These procedures are consistent with the Clean Air Act provisions.

5.2.3 Comment: One commenter (IV-D-16) stated that it is feasible, both technically and economically, for portland cement kilns to use fuels and raw materials with low metals content. Feed limits are particularly appropriate for lead and cadmium, which are known to be toxic, persistent, and bioaccumulate, and therefore have significant adverse "non-air quality health and environmental impacts." Because feed limits are an achievable measure that would further reduce emissions, EPA must require them. Further, EPA must consider the specific "non-air quality health and environmental impacts" of metals in deciding the feed limits that are "achievable."

Response: Feed and/or fossil-fuel switching has not been undertaken by any NHW kilns to reduce metals emissions, and therefore this is not a MACT floor option.

The use of feed material or fuel selection and feed material or fuel blending to achieve lower metals emissions thus is a potential beyond-the-floor technology. Cost is a consideration in the decision to go beyond-the-floor. The ability of a

facility to remain cost competitive typically depends on the use of raw materials mined in close proximity to the facility. Several commenters described the economic difficulties in locating, purchasing, and transporting feed materials to existing sites; the comment to the contrary stated the opposite categorically, but provided no supporting cost, economic, or technical data. [See Sierra Club, slip op. p. 13 (rejecting argument that pollution prevention measures had to be included as part of a standard where costs were not adequately quantified).] The EPA disagrees with this comment. Cement kilns require enormous amounts of raw material, and the costs of transporting the raw material are enormous, given the volumes involved. Finding a new source of raw material will often (if not invariably) entail more costs because the source of the raw materials will be farther from the facility. The Agency believes that in many cases a facility could not even remain economically viable were existing sources of raw material to become unavailable.

In the case of NHW kilns, similar to feed materials, fuel switching is not a demonstrated metals control technology. There are no data available to EPA that indicate that this technology can or has achieved metals emission reductions from NHW kilns. A HW kiln operator can control metals via the hazardous waste fuel, but this is not an option available to NHW kiln operations. See additional responses to comments in this chapter regarding this issue.

5.2.4 Comment: The EPA proposed to use particulate matter (PM) as a surrogate for all metals "because the floor control techniques for non-volatile and semi-volatile metal HAPs are the same as the control techniques for PM." Comments on this issue follow.

1. One commenter (IV-D-16) stated that PM is not a valid

surrogate for cadmium and lead, both of which the Agency has already characterized as semi-volatile metals, because the control efficiency for cadmium and lead is generally lower than that for total PM. (Cadmium and lead could adsorb onto fine PM that is less effectively collected than large particulate matter).[10] Therefore, PM is not a valid surrogate for cadmium and lead. The EPA must set separate emissions standards for these metals, particularly in light of the section 129 mandate.

Response: Regarding the section 129 mandate, see the response to comment 2.1.1. Second, the EPA has selected emission limits at the floor level of control. Although the EPA agrees that the control efficiency for semi-volatile metals *may* not be as effective as it is for total PM, however, control of cadmium and lead at floor levels is still achieved effectively by control requirements for PM, which serves as a surrogate (docket items II-B-62 and II-D-195). There are no data on removal efficiencies for cadmium and lead emissions from NHW cement kilns that are controlled with ESPs and FFs (the technology on whose performance the PM standard is based). However, cadmium and lead removal efficiencies were determined for ESPs and FFs at electric utility steam generating units (Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units - Final Report to Congress, volume 1, 453/R-98-004a, February 1998, p. 13-23 and 13-26). The average removal efficiencies for FFs and ESPs were at least 72 percent for cadmium and at least 93 percent for lead, for a total of 22 tests. Based on these removal efficiencies, well-designed and properly-operated ESPs and FFs will reduce cadmium and lead emissions from cement kilns.

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[10] EPA Draft Technical Support Document for HWC MACT Standards (NODA), April 1997.

The final rule retains the use of PM as a surrogate for HAP metals (semi-volatile and non-volatile) because the MACT floor equipment and level of control for HAP metals, i.e., properly designed and operated fabric filters (FFs) and electrostatic precipitators (ESPs), is identical to that for PM. Using PM as a surrogate for specific HAP metals eliminates the cost of performance testing to comply with numerous standards for individual metals, and achieves exactly the same level of HAP metal emissions limitation. Furthermore, sufficient data do not exist to identify emission limits for metals such as lead and/or cadmium associated with MACT and EPA is unable to establish emission limits for these pollutants in this rule. [See Sierra Club v. EPA, no. 97-1686 (D.C. Cir. 1999) slip op. at 15 (EPA is not obliged to establish a MACT standard for HAPs for which the Agency is unable to quantify emission reductions).] Even if such emission limits could be developed, however, they would not result in any further reduction in emissions beyond that achieved by the MACT rule, given the PM standard.

2. One commenter (IV-D-18) urges EPA to abandon its approach of using PM as a surrogate for non-volatile metal HAPs, since the Clean Air Act allows EPA to provide an exemption where the environmental benefits of a requirement would be trivial when compared to the associated administrative and compliance cost (see Alabama Power vs. Costle, 636 F.2d 323, 359-61 [D.C. Cir. 1979]). Furthermore, such *de minimis* principles are acknowledged the Clean Air Act's air toxic provisions in section 112(g)(1) and in the Wood Furniture NESHAP (40 CFR part 63, subpart JJ, Table 5 and 63 FR 34336 [June 24, 1998]). Or, at a minimum, the Agency should specify a percentage of PM below which, for HAP metals, EPA will not use the surrogate

scheme. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) do not object to the use of a PM emission limitation as a surrogate for a HAP metal limitation as it currently is proposed. These commenters believe that controlling PM should substantially limit HAP metal emissions without imposing unreasonable burdens on the industry. Seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) support the EPA conclusion that PM serves as an adequate surrogate for metals other than mercury and that emission limits for individual metals, including mercury, are unnecessary. Exhibit 7 in docket item IV-D-29 explains why PM serves as an adequate surrogate for non-mercury metals and notes that with the projected low health risks, the compliance costs for regulating specific metals (excluding mercury) are not justified.

Response: It should be noted that commenter IV-D-18 recommended that, in addition to abandoning its PM surrogate approach, the EPA should delete the PM standard altogether. The EPA proposed using PM as a surrogate for non-volatile metal HAPs, and generally agrees with the reasons as set forth by commenters other than IV-D-18 supporting this approach. Non-volatile metal HAPs are present in kiln, clinker cooler, and materials handling exhaust PM (docket items II-B-62 and II-I-44), and the MACT floor technology removes metal HAPs from the exhaust gas while collecting PM. Using PM as a surrogate for specific HAP metals eliminates the cost of performance testing to comply with numerous standards for individual metals, and achieves the MACT floor level of HAP metal emissions limitation. Effective non-volatile and semi-volatile metals control is achieved through

effective PM control.

With regard to de minimis exemptions, see the response to comment 2.3.2.

3. Two commenters (IV-D-24 and IV-D-25) stated that the EPA rationale for relying on PM as a surrogate for metals emitted from NHW kilns applies equally to kilns under the HWC proposed rule.

Response: HAP metal emissions come from HAP metals present in the feed and the fuel. Hazardous waste burning kilns may have higher levels of HAP metals in their fuel. The MACT floor technology for hazardous waste kilns includes controls on toxic metals present in HW fuel (since all hazardous waste kilns are required to control metal levels in their hazardous waste input to the kiln) to better limit HAP metal emissions. Control of PM from NHW kilns will provide floor level control of nonvolatile and semi-volatile HAP metals. This comment pertains to the HWC proposed rule, and has been forwarded to the EPA Office (Office of Solid Waste) responsible for the HWC rulemaking.

5.2.5 Comment: The following comments were received on the PM emission limit.

1. One commenter (IV-D-16) stated that the proposed floor for existing kiln and in-line kiln/raw mill PM HAP emissions (0.15 kg PM/Mg dry feed) is based on the performance of the worst source (for which the Agency had data). This approach violates the CAA in that standards for existing sources must not be less stringent than the "average emission limitation achieved by the best performing twelve percent of the existing sources (for which the Administrator has emissions information)."

One commenter (IV-D-33) stated that Table 7 shows

that the existing PM controls are currently meeting PM limits well below those proposed. Table 7 lists 25 kilns with PM emissions well below 0.15 kg/Mg. Many of these kilns are operating at an order of magnitude lower (i.e., 0.015 kg/Mg), and most are below 0.10 kg/Mg. The proposed PM limit ignores the much better performance that ESPs and FFs on existing kilns are achieving today and also ignores 22 years of improvement in ESP and FF technology. The proposed PM MACT limit equals the New Source Performance Standard (NSPS) that is 22 years old.

2. According to one commenter (IV-D-16), the proposed PM standard for existing kilns and in-line kiln/raw mills must not be less stringent than 0.0054 kg PM/Mg dry feed, that is based on the best performing twelve percent of existing sources (for which the Administrator has emissions data). If EPA believes that the emissions data are not representative of the portland cement manufacturing category, it must use its authority under section 114 to obtain representative data.
3. According to one commenter (IV-D-16), based on the emission control that was achieved in practice by the best controlled similar source, the PM emission standard for new sources must not be less stringent than 0.0011 kg PM/Mg dry feed. If EPA believes that this emission number is not representative of the emission control that was "achieved in practice by the best controlled similar source," it must use its authority under section 114 to obtain representative data.
4. One commenter (IV-D-28) recommends that EPA consider strengthening the PM requirements.

5. One commenter (IV-D-33) stated that the proposed PM limits for kilns and in-line kiln/raw mills are too lax to satisfy the CAA's definition of MACT and are too lax to achieve any meaningful reduction in HAPs. The proposed PM limits reflect clean air policy of 25 years ago. Readily-available APCDs (such as electrostatic precipitators and fabric filters) routinely achieve lower limits.

Response to issues 1 through 5: The proposed PM standards have been retained in the final rule. The EPA evaluated the MACT floor technology for both existing and new sources at proposal and determined that the MACT floor is based on the performance of properly designed and operated FFs and ESPs. Commenters provided no data to support their position that an alternative design or technology represents a floor technology that could achieve a lower level of PM emissions on a consistent basis. Nor could the EPA identify other technologies for existing or new kilns or in-line kiln/raw mills that would reflect a floor level and consistently achieve lower emission levels of PM than the NSPS limit.

As discussed in the proposal preamble, the data upon which the MACT floor was based were obtained from EPA Method 5 compliance tests on kilns subject to the NSPS and represent performance of PMCDs associated with new kilns over a relatively short period (typically three 1-hour test runs). These test data were obtained at kilns equipped with well-designed and operated ESPs and FFs representative of the MACT floor, which is also represented by the NSPS emission level. Method 5 testing of these cement kilns equipped with MACT floor technology showed a range of emissions up to the NSPS level. Additional Method 5 tests performed on some of the same kilns included in the MACT floor analysis showed PM variations after control as plotted in

docket item IV-B-10, confirming that some operating variability is inherent. The EPA believes that these data reasonably represent levels achievable in practice by the average of the best performing 12 percent of sources, and by accounting adequately for variability, further assure that the standard will be achievable under the worst forseeable circumstances consistent with proper design and operation. Sierra Club, slip. op. p. 13. In summary, the PM emission limit reflects an emission level consistently achievable with the use of well designed and operated MACT floor technology.

With regard to use of section 114 authority, all that is required of EPA in choosing a data set to establish a MACT floor is that the data "allow EPA to make a reasonable estimate of the performance of the top 12 percent of units." Sierra Club v. EPA, F. 3d; 1999 U.S. App. Lexis 3162 at 7 (D.C. Cir. 1999). Moreover, the commenter's premise appears to be that the Agency should not act until it has perfect data in hand. Given the mandatory statutory deadlines for issuing standards (compounded by deadline suits in some instances), this is not a realistic option if the standards are to issue on time. The statute indeed contemplates that EPA need not delay standards to collect the perfect data set, since the MACT floor is to be based on the average performance of the best performing 12 percent of existing sources "for which the Administrator has emissions information". CAA section 112 (d) (3) (A). Finally, it is a standard tenet of administrative law that "EPA typically has wide latitude in determining the extent of data-gathering necessary to solve a problem. [Courts} generally defer to an agency's decision to proceed on the basis of imperfect scientific information, rather than to 'invest the resources to conduct the perfect study.' Sierra Club, supra, at 7. Given that the data used to develop these standards reasonably predicts performance of the best performing 12 percent of facilities, and the practical

limitations on developing an additional data base, EPA finds that no further data generation is necessary.

6. Two commenters (IV-D-24 and IV-D-25) support the EPA/OAQPS decision to base the PM standard on units of mass per unit of production and noted that the rationale for the decision is equally valid for HW kilns.

Response: This NESHAP provides consistency with the NSPS, which have production-based PM standards. Comments on the standard for HW cement kilns have been referred to EPA/OSW.

7. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) urge EPA to clarify that PM is not a HAP. According to section 108(a), PM is a criteria pollutant. Section 112(b)(2) prohibits EPA from controlling PM as a HAP.

Response: The EPA is repeating in the preamble to the final rule that PM is not a HAP but is used as a surrogate for non-volatile and semi-volatile metal HAP.

8. One commenter (IV-D-33) stated that since the compliance date for the proposed rule is about four years away, there will be little, if any, upgrading of existing particulate controls. Many kilns are already achieving the proposed limit, and others are being upgraded to this level through routine maintenance.

Response: The rule will ensure continuous compliance with the standard when it goes into effect. This includes necessary routine maintenance and repair. The EPA estimated costs of upgrading ESPs (with the addition of a new field) for 26 kilns, and upgrading fabric filters (by replacing bags) for 14 kilns and 59 clinker coolers, and believes the need for control upgrades is independent of the compliance date. The EPA acknowledges that some kilns not meeting the standard may do so through additional

maintenance.

9. One commenter (IV-D-33) stated that the proposed 20 percent opacity limit for kilns and in-line kiln/raw mills made sense 30 years ago but does not make sense today. It is inconsistent with the 10 percent opacity limit proposed for clinker coolers, especially given the fact that achieving a given opacity limit is easier with kilns than clinker coolers. This is because the moisture content of the flue gas is higher and the resistivity is better in the kiln than in the clinker cooler. Thus, an ESP will operate more effectively on kiln exhaust gases than on clinker cooler gases. Also, because of smaller process volumes and stack diameters, a 10 percent opacity limit for a kiln is comparable to a 20 percent opacity limit for a power plant.
10. Seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) support the EPA decision on the proposed PM and opacity limits for kilns and in-line kiln/raw mills. The reasons for their support included preference for these limits over the use of PM CEMS and preference for the surrogate approach as opposed to specific limits on HAP metals as was proposed in the HWC kiln rules.
11. One commenter (IV-D-33) stated that the proposed MACT is illegal. The EPA should promulgate or re-propose tighter PM emission limits as MACT, in order to avoid setting a limit that does not reflect current technology and does not reduce HAPs.

Response to 9-11: The EPA agrees with the seven commenters that supported the opacity limits.

Since the industry uses both electrostatic precipitators and fabric filters to control particulate matter, the resistivity of

kiln and clinker exhaust gases is not an issue for sites that use fabric filters. However, it should be noted that half of the NHW cement kilns are controlled by ESPs, the other half by fabric filters; whereas most if not all clinker coolers are controlled by fabric filters. The issue of pathlength (i.e., gas volumes and stack diameters) is but one of several factors that affect opacity levels. The concentration and particle size of PM, two additional factors that affect opacity levels, differ for kiln and clinker gases. Kiln gases contain PM from combustion gases, raw materials, and clinker, whereas clinker gases contain clinker dust. Further, the commenter provided no data or analysis to support the claim that a 10 percent opacity limit for a kiln is comparable to a 20 percent opacity limit for a power plant.

Regarding the comment that the proposed MACT is illegal, and that a tighter PM emission limit should be promulgated, see the response to comment 5.2.5.1 - 5.2.5.5.

12. One commenter (IV-G-5) suggests that, in order to clarify the averaging period over which the emission limit applies, the PM emission limit should be written in section 63.1343(b)(1) as "contain particulate matter in excess of 0.15 kg per Mg (0.3 lb per ton) *averaged over a three-hour period*..."

Response: Initial compliance with the PM limit is determined on the basis of three runs of Method 5 and section 63.1348(b)(1)(i) of the rule specifies that each run shall be conducted for at least one hour.

5.2.6 Comment: Comments on the correlation between emissions of PM and HAP metals and between opacity and PM are noted below.

1. Commenter (IV-D-18) stated that there is no valid technical basis presented to support a quantifiable relationship between PM emission levels and non-

volatile metal HAP emissions at cement plants. The very limited information cited in the preamble seems to suggest that the relationship between hazardous metal emissions and PM emissions is highly variable.

2. Commenter (IV-D-18) stated that there is no information presented by EPA about the variability of a PM and HAP metal relationship over time at a particular facility and the variability of this relationship between plants, raw material sources, geographical areas, etc.

3. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA's analysis of the relationship between HAP metals and PM was not sufficiently rigorous. Data should be obtained from regulated kilns to establish variability between kilns and within kilns, and rigorously statistically analyzed to demonstrate a relationship, if it exists.

Response to issues 1, 2, and 3: It has been established that HAP metals are present in particulates generated in preparation of cement kiln feed, in particulates generated during pyroprocessing of cement feed materials, and in particulates generated in processing of cement clinker and cement (docket items II-B-62, II-C-94, II-I-43, II-I-44). The EPA acknowledges that the metals content in PM may vary from kiln to kiln, and day to day. This variability is due to the inherent variation of process operational parameters, and the inherent variability of the metals content in the feed materials and fuels. The commenters provided no additional data on particulate composition. The rule will result in upgrades of existing and installation of new particulate control equipment that performs at least as well as the MACT floor control technology on whose performance the standard is based. This will result in control

of HAP metals at the level of the MACT floor.

There are no data on removal efficiencies for non-volatile and semi-volatile HAP metal emissions from NHW cement kilns that are controlled with ESPs and FFs. However, such removal efficiencies were determined for ESPs and FFs at electric utility steam generating units (Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units - Final Report to Congress, volume 1, 453/R-98-004a, February 1998, p. 13-23 and 13-26). The average removal efficiencies for FFs and ESPs ranged from 72 percent to 99 percent, for a total of 22 tests. Based on these removal efficiencies, well-designed and properly-operated ESPs and FFs will reduce non-volatile and semi-volatile HAP metal emissions from cement kilns.

Establishment of HAP metal-specific limits would increase testing and monitoring costs and achieve no additional control of HAP metals. No HAP metal-selective control techniques are presently available upon which to establish other floor levels. No data are available which would support a floor for standards based on raw material sources. See the response to comment 5.2.4.

4. One commenter (IV-D-28) is concerned with whether the correlation between opacity and PM emissions is reliable, especially with a PM emission limit based on production.

Response: The rule has been changed to reflect that opacity is a separately enforceable emission limit. An exceedence of the opacity limit is a violation of the standard. The final rule retains the kiln opacity limit at 20 percent, consistent with the MACT floor level for PM, which was based on the NSPS. Opacity can be continuously measured with COMs.

5.2.7 Comment: Comments on EPA's HAP metals and PM emissions data are noted below.

1. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) noted that data in docket item II-I-44 indicate that the HAP metal content in cement kiln dust (excluding cobalt) ranges from less than 0.01 to 0.8 percent by weight. The U.S. Bureau of Mines data (also presented in docket item II-I-44) indicate that the metals content for cement kilns ranged from less than 0.01 to 0.5 percent by weight. Data in docket item II-B-62 indicate that the ratio of metal HAPs to total filterable particulate ranges from 0.12 to 0.23 percent, depending on whether tests with zero metal HAP emissions are counted. (Thus, data in docket items II-B-36 and II-B-62 do not agree.) The PCA metals concentration data range from less than 0.01 to 0.07 percent by weight. None of the available data provide an accurate assessment of the total concentration of HAP metals in particulate emissions. If such data are needed for cement kilns and/or alkali bypass streams, tests should be conducted using EPA Method 29. Grab samples of material handled in clinker coolers, finish mills, and material transfer sources should be analyzed to determine the HAP metals content. Until accurate data are available, the use of the 1 percent factor (which significantly overstates the percentage of HAP metals in PM) should not be used. This inaccuracy must be corrected in the final rule.

Response: The purpose of estimating HAP metal content of PM is to estimate HAP metal emissions and reductions on a national basis. The precise ratio of HAP metals to PM does not affect the determination of MACT floor. See the responses to comments 5.1.3 and 5.2.4. The EPA reviewed and considered the emissions data

summary provided in docket item II-D-195, as well as other information available to the Administrator and included in the docket. With respect to HAP metals in PM, only data collected during short term testing with manual methods were available, and these data demonstrate a large range of metals concentrations in PM. To estimate impacts EPA selected 1 percent as the fraction that is within the range of fractions obtained from different databases. EPA agrees with the commenter that using actual site-specific test data, e.g., from EPA Method 29 or laboratory analysis of materials, is preferable to using an emission factor.

2. One commenter (IV-D-27) suggests that EPA verify the data in Table 7 of the proposal preamble (since the data on Colorado facilities appears to be dated) and list the dates that the respective stack tests were performed. Specific entries that should be revised include:

   j. the Ideal Basic plant in LaPorte, Colorado was purchased by Holnam over ten years ago, and this plant has a calciner and not a preheater (as indicated in the table).

   k. Martin Marietta in Lyons, Colorado is currently owned and operated by Southdown.

Response: The plant identifications indicate ownership of the facility at the time of the emission test. The test data are listed in the "revised Table 7". These test data were subjected to quality assurance requirements and were used to establish compliance with the NSPS. The age of the data does not affect their validity. Test dates were added to the revised Table 7. The commenter did not provide any more recent data.

The data in the revised Table 7 were obtained from EPA Method 5 compliance tests on kilns subject to the NSPS and represent performance of PMCDs associated with new kilns over a

relatively short period (typically three 1-hour test runs). These test data were obtained at kilns equipped with well designed and operated ESPs and FFs representative of the MACT floor, which is also represented by the NSPS emission level. Method 5 testing of these cement kilns equipped with MACT floor technology showed a range of emissions up to the NSPS level.

Table 7 (revised). Particulate emissions from NSPS kilns

Kiln type	APCD type	PM (kg/Mg dry feed)	Test date	Location
PH	FF	0.0011	1/93	Southdown - Kosmosdale KY
PC	FF	0.0039[a]	10/91	Boxcrow Cement - Midlothian TX
PH	ESP	0.0075[b]	8/91	Ash Grove - Durkee OR
DRY	FF	0.0090[a]	8/92	Southdown #1 - Fairborn OH
PC	ESP	0.015[c]	4/90	RMC Lone Star - Davenport CA
PC	FF	0.015	9/83, 10/83	Kaiser Cement - Cupertino CA
PH	ESP	0.015	12/90, 5/91	Roanoke Cement - Cloverdale VA
PC	FF	0.020	12/79	Moore McCormack - Knoxville TN
PH	FF	0.029	9/82	Moore McCormack - Brooksville FL
PC	FF	0.033	5/83	Kaiser Cement - Lucerne Valley CA
PC	FF	0.035	5/83	Calif Portland - Mojave CA
PC	FF	0.04	6/83	Martin Marietta - Leamington UT
PC	ESP	0.044	NA	Kaiser - San Antonio TX
PC	FF	0.048	10/80	Martin Marietta - Lyons CO
PH/PC	ESP	0.051[b]	8/92	Lone Star - Cape Girardeau MO
WET	ESP	0.056	5/82	Monolith Portland - Laramie WY
DRY	FF	0.056	3/80	Lone Star - Pryor OK
DRY	ESP	0.058[d]	5/95	Ash Grove #2 - Louisville NE
PC	ESP	0.065	5/82	General Portland - New Braunfels TX
PC	FF	0.068	8/83	Davenport Industries - Buffalo IA
PH	FF	0.070	4/82	Ideal Basic - La Porte CO
PH	FF	0.074	2/83	Southwestern Portland - Odessa TX
DRY	ESP	0.11	5/92	Ash Grove #1 - Louisville NE
PC	ESP	0.12	7/81	Texas Industries - Hunter TX
PC	ESP	0.13	6/83	Lehigh - Mason City IA
WET	ESP	0.15	11/79	Genstar - San Andreas CA
WET	FF	0.15	9/80	Lone Star - Salt Lake City UT

5.3 Selection of Emission Limits: D/F

5.3.1 Comment: The following comments were received on the dioxin/furan emission limit.

1. One commenter (IV-D-14) stated that the proposed standard of 0.40 ng TEQ/dscm for new kilns, that is less stringent than the emissions achieved by most existing kilns (based on dioxin/furan emissions data listed for 15 of 19 existing kilns), is inconsistent with section 112(d)(3) of the Clean Air Act. The standard must be no less stringent than that achieved by the best controlled similar source. EPA should correct this deficiency.
2. One commenter (IV-D-16) stated that EPA's dioxin standards are inconsistent with the section 112(c)(6) listing and violate section 112(c)(6). Although EPA has proposed standards for dioxins, the standards are not section 112(d)(2) or (d)(4) standards as required by the Act.

Response to issues 1 and 2: The standards are consistent with 112(d)(2) and (3). (Since dioxins are HAPs for which no health threshold has been determined, the pollutant is not eligible for consideration under section 112(d)(4).) With regard to the comment about 112(c)(6), see the responses to comments under section 2.3 of this document.

The EPA has reviewed the existing test data and literature on D/F formation and concluded that the selected emissions limits represent the MACT floor and are consistently achievable. Again, EPA is influenced by the fact that cement kilns using the floor control technology achieved different D/F levels in their

performance tests -- indicating that different levels reflect normal variability of the process and control technology. Consequently, EPA is retaining the proposed standard for D/F emissions from kilns and in-line kiln/raw mills in the final rule.

In order to establish a more stringent emission limit for new kilns, it is necessary to identify a different technology to which better performance is attributable. Since EPA could not identify a different technology for new kilns, the standard is based on the range of available data, considering process and control device variability.

The EPA determined that the MACT floor technology for both existing and new sources was inlet PMCD temperature control to 400° F accompanied by good combustion and process control. Based on data evaluated at proposal, the technology can be represented by the dual standard of 0.2 ng TEQ/dscm or 0.4 ng TEQ/dscm with a PMCD inlet temperature of 400° F or less. The performance test data are based on short-term tests but do indicate that all kilns will achieve the numerical emission limit of 0.4 ng TEQ/dscm with the application of the floor technology. Thus the 0.4 ng TEQ/dscm emission limit is retained to account for normal inherent process and air pollution control device operating variability, including the use of various fuels, such as tires.

3. One commenter (IV-D-14) stated that the proposed dioxin/furan standard for new kilns does not encourage careful control of the combustion process. EPA should correct this deficiency.

Response: The EPA does encourage careful control of the combustion process, by recognizing and making its determination of the MACT floor for D/F based in part on proper combustion. Proper combustion coupled with the control of gas temperature at the inlet to the PMCD will result in lower D/F emissions. The

final rule does not require monitoring of combustion parameters such as CO or THC because THC and CO emissions from NHW cement kilns are largely due to formation outside of the combustion zone, i.e., due to the feed materials. Therefore THC and carbon monoxide emissions might not accurately reflect combustion conditions, therefore the EPA has not included CO monitoring requirements to ensure good combustion. However, the final rule has been changed to include a monitoring requirement for an inspection of combustion system components to be conducted at least annually.

4. One commenter (IV-D-16) stated that the proposed standard of 0.4 ng TEQ/dscm reflects the performance of the worst source evaluated by the Agency. Reliance on the worst performing source is especially egregious since EPA has no idea why the facility performs so poorly. In basing the proposed dioxin limit on the worst performing source, the Agency violated the requirement in section 112(d) of the CAA that the floor shall not be less stringent than the emission limitation achieved by the best performing twelve percent of existing sources.

Response: The EPA determined that the MACT floor technology for both existing and new sources was inlet PM control device temperature control to 400° F accompanied by good combustion and process control. Based on data evaluated at proposal, the technology is represented by the dual standard of 0.2 ng TEQ/dscm or 0.4 ng TEQ/dscm with a PM control device inlet temperature of 400° F or less. Performance test data from some facilities using the MACT floor indicates D/F concentrations substantially less than the 0.2 emission limit are achieved, but other data also indicate that the 0.2 level may not be consistently achievable across the range of feed materials and fuels by all facilities

employing the MACT floor level of control. The EPA had no reason to throw out the 0.4 level test data, since the kiln was operating within the requisite temperature range and no other factors pointed to improper operation. The performance test data are based on short-term tests but do indicate that all kilns will achieve the numerical emission limit of 0.4 ng TEQ/dscm with the application of the floor technology. Thus the 0.4 ng TEQ/dscm emission limit is retained to account for normal inherent process and air pollution control operating variability, including the use of various fuels, such as coal, coke, and waste materials such as tires.

5. One commenter (IV-D-16) stated that the proposed dioxin standard is inconsistent with the Agency's factual finding that an estimated 75 percent of cement kilns could meet a 0.2 ng TEQ/dscm limit.
6. One commenter (IV-D-16) stated that the proposed dioxin standard for existing sources must not be less stringent than 0.0023 ng TEQ/dscm, which is the average emission value of the three best performing sources ("the best performing 12 percent of existing sources for which the Administrator has emissions information").
7. One commenter (IV-D-16) stated that EPA's proposed dioxin standard for new sources blatantly violates the CAA, which mandates that standards for new sources must not be less stringent than "the emission control that is achieved in practice by the best controlled similar source, as determined by the Administrator." The dioxin emission control that was achieved in practice by the best controlled similar source was 0.0009 ng TEQ/dscm. Therefore, the dioxin emission standard for new sources must not be less stringent that 0.0009 ng TEQ/dscm.

If EPA believes that 0.0009 ng TEQ/dscm is not representative of the emission control that was "achieved in practice by the best controlled similar source," it must use its authority under section 114 of the CAA to obtain data that are representative of such emission control.

Response to issues 5, 6, and 7: In order to establish a more stringent emission limit, it is necessary to identify the differences in technology to which the better performance is attributable. Since EPA could not identify a different technology, the standard is based on the range of available data, considering process and control variability. See the responses to issues 1-4 for this comment (5.3.1). With regard to the use of section 114 authority, see response to comment 5.2.5.3.

8. Commenter (IV-D-20) supports EPA's decision to use dioxin and furan congener toxic equivalent factors (TEF) in calculating D/F TEQ values.

Response: The EPA acknowledges the support for the use of TEF factors.

9. One commenter (IV-D-20) stated that Greg Rigo's presentation to EPA on the *Measurement Precision Overview of EPA/OSW Analysis* shows that it is difficult to set a firm limit for dioxin TEQ emissions. His data show that a limit of 0.2 ng TEQ/dscm is more accurately represented by the range of 0.14 to 0.26 ng/dscm while a limit of 0.4 ng/dscm is more accurately represented by the range of 0.25 to 0.55 ng/dscm.

Response: The EPA is required to establish a limit, not a range of values. The numerical emission limits represented by the MACT floor technology reflect the normal variation in process and air pollutuon control device operation, as well as variability in the test measurement and the expected variation in run to run precision.

10. Two commenters (IV-D-22 and IV-D-23) suggested that the proposed dioxin/furan standard

a. should be changed to read 0.2 ng dioxin/furan as TEQ per normal cubic meter as measured in the kiln exhaust stack or 400°F in the kiln exit gas as it enters the APCD.

b. Six commenters (IV-D-24, IV-D-26, IV-D-29, IV-G-3, IV-G-4, and IV-G-6) recommended that EPA revise the proposed standard to 0.2 ng TEQ/dscm or 400°F.

c. One commenter (IV-D-25) suggested that the floor standard be either 400°F or 0.4 ng TEQ per dscm.

d. One commenter (IV-D-35) suggested that the floor be either 0.2 ng TEQ/dscm or 418°F.

e. One commenter (IV-D-22) believes that the vast majority of portland cement plants will easily meet the 0.2 ng standard at current operating temperatures. This is appropriate because temperature control of the kiln exit gases is the only legitimate control technology available to portland cement kilns for the control of dioxins/furans. It has been clearly shown that reducing the temperature below 400°F does not reduce dioxin/furan emissions because of the kinetics of the reactions connected with dioxin/furan formation.

f. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated stated that if a source cools its APCD inlet gas to less than 400°F and its dioxin/furan emissions are greater than 0.4 ng TEQ per dscm, the source has no alternative but to shut down the kiln because there is no proven or cost-effective BTF technology to reduce dioxin/furan emissions. If the standard is not revised, EPA may have to later undertake revisions to the dioxin/furan standard in the event that a kiln exceeds the 0.4 ng TEQ per dscm limit with an APCD inlet temperature less than 400°F.

Response to comment 10: The rule allows emissions up to 0.4

ng/dscm dioxin/furan TEQ only in cases where the PM control device inlet gas temperature is at most 400°F. The 0.4 limit is retained along with the temperature requirement to ensure that D/F emissions are reduced, and will indicate any need to improve combustion and kiln operation, the other components of the MACT floor. Sources meeting the 0.2 ng/dscm standard are not restricted to controlling their APCD inlet temperature to below 400°F. The commenter in d. above provided no data or rationale for the 418 °F limit. Based on the data, most if not all kilns can meet the 0.2 ng/dscm standard with the MACT floor technology (reduction of temperature to 400 °F and proper combustion). The EPA did not identify a MACT control technology more effective than temperature reduction, proper combustion, and kiln operation. (The EPA considered the beyond-the-floor control technology of activated carbon injection, but it was determined to not be a cost-effective control technology [docket item II-B-67].)

The emission limit assumes good kiln operation, good combustion and effective gas cooling. Kilns that are unable to achieve the 0.4 limit by temperature reduction alone should improve operation of the combustion process, the kiln, and/or the PM control device. Based on data in docket item II-B-78 and discussions with the industry the EPA believes that all kilns will be able to meet the standard with MACT. The commenters provided no additional data to show that the limits suggested in items c and d would control D/F emissions as effectively as the limits in this rule. Moreover, the commenters provided no additional data to show that gas cooling below 400 °F would have no effect on D/F emissions, and thus failed to provide any support for their contention that a source might operate with properly designed and operated MACT technology but still not achieve the D/F standard. The EPA believes that all sources can meet the standard with good combustion, good operation and

temperature reduction to 400 ºF.

11. One commenter (IV-D-35) believes that the dioxin/furan standard is too complex, could be simplified, and should be coordinated with the OSW rule for HWCs. The OAQPS should consider dropping the 0.4 ng/dscm and increase the inlet temperature to 418°F to be consistent with the proposed HWC rule. Thus, the revised standard would be 0.2 ng TEQ/dscm or 418°F. This would allow sources that meet the concentration limit to operate above 418°F without incurring the expense of lowering the temperature at the ESP or FF.
12. One commenter (IV-D-24) noted that despite EPA's conclusions regarding the similarities in dioxin/furan emissions from HW and NHW kilns (in the May 2, 1997 notice of data availability), there are two separate dioxin/furan emission rules (one for HW and one for NHW cement kilns).
13. One commenter (IV-D-25) stated that the EPA/OAQPS rationale for the proposed dioxin/furan emissions standards for NHW kilns is equally true for HW cement kilns. Commenter (IV-D-23) stated that an accurate and appropriate analysis of data in the proposed HWC rule would result in the same conclusions reach for NHW cement kilns.

Response to comments 11-13: The EPA reconsidered the D/F emission limits for HW cement kilns. The final HW cement kiln rule has been changed since its proposal and includes identical MACT standards for D/F emissions from HW cement kilns as the NHW kiln rule. See also the response to comment 10 above.

14. One commenter (IV-D-28) opposes the two dioxin/furan emission limits. The preamble discussion suggests that EPA believes that the 0.2 ng limit is appropriate and

achievable but is trying to accommodate one or two facilities that may not currently be able to meet the 0.2 ng limit. The commenter recommends that EPA establish a single emission limit for dioxin/furans, since setting multiple emission limits to account for variability within an industry seems to subvert the process for identifying a MACT floor.

Response: The EPA identified the control technology that represented the MACT floor for new and existing sources. The 400 ºF temperature limit, along with good combustion practices and good process control represents the MACT floor technology. The numerical emission limits are representative of the emission limitation achievable by the MACT floor control technology and take into account the normal inherent process and air pollution control device operating variability, including the use of various fuels.

15. One commenter (IV-G-1) believes it is appropriate for EPA to establish a BTF standard for dioxin/furan emissions from portland cement manufacturers, given the special concern about dioxin/furans from EPA, Congress, and this commenter. Portland cement kilns might easily achieve a BTF standard as the EPA data already show that dioxin/furan emissions from 10 of 13 tests conducted at stack temperatures below 400°F did not exceed 0.2 ng TEQ/dscm.

    A possible BTF standard might be to require a temperature reduction to 400°F, in conjunction with proper control of kiln and PMCD operation and efficient combustion, to achieve an emission limit of 0.2 ng TEQ/dscm. Though such a BTF stand will be very conservative and will not accommodate variability in

dioxin/furan emissions for NHW cement kilns, it will not be too onerous of a burden on the industry. It will however require all portland cement manufacturers to install control technology that achieves the maximum emission control currently available. This would fulfill Congress' intention for section 112.

Response: The MACT floor technology is temperature control to 400 ^{o}F, good combustion and good process control; this is not considered a beyond the floor option. The 0.4 ng/dscm limit is representative of performance of MACT floor technology and is needed, based on the data that were available to EPA, to account for normal inherent process and air pollution control device operating variability, including the use of various fuels.

The only beyond the floor technology that EPA identified is activated carbon injection. This was considered and found not to be cost-effective.

16. One commenter (IV-G-6) stated that EPA should delete the emissions cap of 0.4 ng TEQ/dscm for the following reasons.

    a. The cap and temperature limit would require that all area and other small entities perform technically complex and needlessly expensive monitoring for dioxin/furans as well as temperature.

Response: Performance testing and monitoring are required to ensure initial and continuing compliance with the standard. The EPA chose the least burdensome testing and monitoring requirements. Testing is required once per 30 months (for consistency with the HWC rule) and inlet PMCD gas temperature, which most, if not all, sources are already monitoring, is the monitoring parameter. The final rule contains a D/F monitoring requirement of an annual inspection of each kiln and in-line

kiln/raw mill combustion system to ensure proper combustion can occur. The issue regarding expense for area and other small entities was addressed in the response to comment 4.5.3 in subsection 4 of this document.

b. Sources that cannot meet the cap even with temperature controls would also face the prohibitive costs of controlling dioxin/furans with activated carbon injection.

Response: The data show that many kilns will be able to meet the 0.2 ng/dscm standard at temperatures higher than 400 ^{o}F. The data provided in the preamble show that the 0.4 ng/dscm standard is achievable by the MACT floor technology (reduction of temperature to 400 ^{o}F and proper kiln combustion). The final rule does not require, and is not based on, activated carbon injection.

c. The use of activated carbon injection at NHW kilns does not seem supportable given that the HWC rule (see 61 FR 17358, 17471-71, [April 19, 1996]) states that there is "very strong evidence that [dioxin/furan] emissions are systematically higher at [cement] plants that burn hazardous waste fuel."

Response: As noted in the response above, the final rule does not require, and is not based on, performance of activated carbon injection.

d. The representativeness and sufficiency of the 0.4 cap have not been demonstrated. The EPA set the cap to accommodate data (that it could not explain) for one kiln. EPA's leap of faith, that a cap of 0.4 ng will accommodate this mystery, does not support a conclusion that all the more than 200 kilns will be able to meet this cap

solely through temperature control. See the National Lime Association vs. EPA, 627 F.2d 416 (D.C. Cir 1980) and 58 FR 65768, 65792-93 (December 16, 1993). The format chosen must "ensure that the technology selected as the basis of the standard can demonstrate compliance in all cases, if the system is properly operated.

Response: The EPA used the available test data it had. The performance test data are based on short-term tests but do indicate that all kilns will achieve the numerical emission limit of 0.4 ng TEQ/dscm with the application of the floor technology: temperature control, good kiln combustion, and proper kiln operation (docket item II-B-78). Thus the 0.4 ng TEQ/dscm emission limit is retained to account for normal inherent process and air pollution control device operating variability, including the use of various fuels.

e. If, as EPA asserts, there are "strong indications that all units will meet the 0.4 ng TEQ/dscm at temperatures of 400°F or below," then an absolute cap of 0.4 ng is not required to achieve this goal.

Response: Under section 112(d)(2), EPA must establish an emission limit at least as stringent as the floor level. The emission limit of 0.4 ng/dscm standard is based on the achievability of the MACT floor, which in addition to temperature control, is also based on proper combustion control and kiln operation. See the response to comment 10 above. If the commenter is suggesting that the Agency establish a temperature control requirement as MACT, then EPA notes that the statutory requirements for establishing a work practice standard are not satisfied here, since it is feasible to establish and enforce an emission standard. Section 112 (h) (1).

f. If some units will not be able to meet the cap with temperature control, then EPA has essentially set a MACT standard based on a BTF technology (activated carbon injection) that was specifically rejected by EPA. This BTF result could invalidate EPA's SBREFA certification since EPA has not included the cost of activated carbon injection in its economics analysis.

Response: As noted in the response to comment 5.3.1 subsection 10, kilns that are unable to achieve the 0.4 limit via gas cooling alone should implement other MACT floor measures, i.e., improve the combustion process and/or operation of the kiln. However, based on data in docket item II-B-78 and discussions with the industry, all existing kilns will be able to improve their performance to meet the standard without the use of activated carbon. The final rule does not require, and is not based on, performance of activated carbon injection. This does not preclude sources from choosing to use activated carbon injection (and adopt the appropriate monitoring procedures regarding injection practices), as a means to meet the MACT floor level of D/F emissions in lieu of temperature reduction, or improvements to combustion and kiln operation. The rules include monitoring procedures for ACI, but requires these procedures only in cases where activated carbon is injected during the D/F performance test.

g. If subsequent compliance monitoring indicates any problem with a temperature-based limit, EPA has the authority to address such issues under its residual risk mandate.

Response: As discussed in the comment responses above, the EPA does not anticipate any “compliance problems” if the MACT floor technology is implemented.

5.3.2 Comment: The following comments were received on dioxin/furan emission controls.

1. One commenter (IV-D-15) noted that the proposed NESHAP discusses carbon injection as a dioxin/furan control technology but carbon injection is not a commercially demonstrated control technology in the industry. The commenter asked what other alternatives do plants have (instead of carbon injection) if they cannot meet the dioxin/furan emission limit?

Response: Plants that presently exceed the D/F standard have the option of installing additional gas cooling capacity and/or improving combustion control and kiln operation. ACI is used commercially on waste combustion sources, and is used at one cement plant to reduce plume opacity.

2. One commenter (IV-D-23) stated that EPA has not demonstrated that a proven and cost-effective beyond-the-floor (BTF) control technology is available for those sources which use the floor technology (temperature control) to minimize dioxin/furan emissions.

Response: The EPA is not required to demonstrate that a BTF technology is available since the rule does not require and is not based on beyond the floor control. However, this technology is in use for medical waste incinerators and municipal waste combustors, as well as on the Waste Technologies Industries hazardous waste incinerator. See above response to comment.

3. The proposed rule requires establishing a separate particulate matter control device inlet temperature with the raw mill on and with the raw mill off. One commenter (IV-D-20) stated that EPA did not cite a data base to justify this proposed requirement. While some data are available, more data are needed to determine

whether such a temperature related control could possibly work.

Response: Raw mill status represents a significant process variation, since it affects temperature, humidity, and other characteristics of the gas stream. One set of performance tests and operating parameters is insufficient to ensure initial and continuing compliance with the standard under both modes of operation. Operators are free to run the PM control device at the lower of the established inlet temperatures at all times if they choose.

4. Commenter (IV-D-20) commends EPA for not dictating specific technology to reduce the kiln gas temperature at the inlet to the PMCD. However, based on the water impacts section on p. 14191, it appears that EPA assumed that water injection would be used. As mentioned in docket item II-B-74, that is not cited in the preamble, there are situations where ESP performance could be degraded with the use of water injection. Thus, the effects of water injection to reduce inlet PMCD temperature are not clear cut.

Response: Cost impacts were estimated assuming gas cooling with water injection, but the owner/operator can decide how best to achieve the D/F limit. The EPA estimated that between zero and ten ESPs may require water injection (docket item II-B-74). Using water injection will decrease the exhaust gas actual volumetric flow rate, which may lead to an improvement in ESP performance. The commenter provided no data to support degradation of ESP performance as a result of water injection.

5. One commenter (IV-D-20) stated that no data have been provided that demonstrate that reduction of the APCD inlet temperature results in a reduction in dioxin/furan emissions for a particular kiln.

Response: This comment is incorrect. D/F emissions testing was conducted at three HW-burning kilns with water injection between the kiln outlet and APCD inlet. The kilns were located at the Ash Grove Cement Foreman Plant (Docket item II-A-42), Continental Cement Hannibal Plant (Docket item II-I-75), and Medusa Cement Wampum Plant (Docket item II-I-94). Water injection reduced D/F TEQ emissions at the three kilns by an average of 70 percent (with a range of 31 to 98 percent). Test results available for two of the kilns (Docket items II-A-42 and II-I-75), show that water injection reduced emissions to approximately 0.6 ng/dscm at inlet ESP temperatures of approximately 480 degrees F.

6. According to commenter (IV-D-20), the EPA contentions of proper combustion/good combustion/poorly controlled combustion conditions regarding the Calaveras dioxin/furan reduction at less than 233°F is not supported by specific data. Further, the Calaveras data should not be used because field blank contamination renders the data "worst case."

Response: The EPA has reviewed the existing test data and literature on D/F formation and concluded that the selected emissions limits represent the MACT floor and are consistently achievable. Eliminating the Calavaras data from consideration would not alter the determination of MACT floor technology and the associated emission limit.

7. One commenter (IV-D-22) stated that the only other suspected cause for possible dioxin/furan emissions are contaminants in raw materials. It is not appropriate to require those few plants to change raw materials. A Congress conference report on the Clean Air Act states that EPA cannot adopt a MACT standard that forces mineral reliant industries to change raw materials.

Response: The EPA is not requiring or suggesting that plants change raw materials to limit D/F emissions. The EPA believes based on data from this industry and several others that the D/F is being formed in the APCD and that rapid temperature quench of the kiln exhaust gas, coupled with proper kiln combustion and operation, will limit D/F formation. However, the Agency notes that the Conference Report language cited by the commenter is not reflected in the statutory text, which states without ambiguity that MACT for all sources can be based on process changes, and material substitution. [Section 112(d)(2)(A).]

8. Ten commenters (IV-D-22, IV-D-23, IV-D-24, Iv-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA correctly concluded that the use of activated carbon injection (ACI) as a BTF control technology is not justified. The following problems are associated with ACI. These problems apply equally to the potential extension of ACI to new or reconstructed kilns for purposes of controlling dioxin/furan emissions.
   a. It is costly.
   b. Temperature control is expected to be effective in controlling cement plant dioxin/furan emissions.
   c. It has not been demonstrated to effectively control potential dioxin/furan emissions from cement kilns.
   d. If the industry were to recycle carbon laden CKD to the kiln, "the carbon would likely be oxidized to form carbon dioxide," thereby increasing cement industry greenhouse gas emissions, which would be in conflict with the Kyoto Protocol.
   e. It will affect the recyclability of cement kiln dust (CKD) and thereby waste mineral resources and

increase cement industry fuel usage and emissions of greenhouse gases and criteria pollutants.

f. There is currently not enough activated carbon available to treat cement kiln exhaust gases.

g. Large volumes of CKD would have to be disposed. Currently over 75 percent of the CKD that is generated annually by the industry is recycled into the cement manufacturing process. Increasing CKD land disposal would be counterproductive.

h. One commenter (IV-D-23) stated that it cannot be used at in-line kiln/raw mills since the collected carbon and CKD would be recycled in the raw feed and introduced at the cool end of the kiln where dioxin/furans would volatilize before reaching the burning zone (1,800°F) of the kiln.

i. One commenter (IV-D-23) stated that it cannot be used by all sources which will be regulated by this rulemaking.

Response: The final rule is not based on, nor does it require, activated carbon injection - because it was not found to be cost effective. However, the EPA does not agree with all of the statements made by the commenters.

9. Two commenters (IV-D-24 and IV-D-25) noted that EPA's OAQPS and OSW examined essentially the same data and same BTF control technology (activated carbon injection) but reached different conclusions on whether the BTF technology was justified. The OAQPS concluded that activated carbon injection was not justified while OSW concluded it was. In the May 2, 1997 notice of data availability (NODA) for the HWC rule, EPA pooled dioxin/furan emissions data for NHW and HW kilns and essentially stated that there is no technical reason

why these two standards should be different (62 FR 24226, May 2, 1997).

Response: The EPA reconsidered the use of carbon injection for control of D/F emissions and decided not to require carbon injection as a BTF control for HW kilns.

10. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) provided an analysis[11] of the potential transfer of activated carbon injection technology from the municipal waste combustor industry to the cement industry for control of mercury emissions and concluded that such a transfer (for controlling HAP emissions from cement kilns) would be highly inappropriate.

Response: The EPA examined the commenters' analysis and does not necessarily agree with their conclusions. However, both EPA and the commenters concluded that activated carbon injection was not a cost effective BTF control technology for NHW kilns.

11. One commenter (IV-D-35) supports temperature control for the reduction or prevention of dioxin/furan emissions. Temperature control meets the central concept of EPA's Waste Minimization National Plan.

Response: The EPA acknowledges the commenter's support for temperature control to control D/F emissions.

12. Two commenters (IV-D-20 and IV-G-3) stated that EPA has inappropriately attributed chlorine entering the kiln system to the formation of chlorinated hydrocarbon and dioxin/furans in the kiln exhaust stack through the following wording.

"chlorine entering the kiln system (from raw

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[11] Attachment A: Review of Activated Carbon Injection for Control of Mercury, prepared by Penta Engineering Corporation, February 5, 1996.

materials and also from fuels) may react with organic compounds present in raw materials or with PICs, to form chlorinated hydrocarbons or dioxin/furan in the kiln stack exhaust." (63 FR 14195)

This statement conflicts with the data in an EPA-sponsored test report (docket item II-A-42) that show that (1) chlorine input rate did not affect dioxin emissions and (2) APCD inlet temperature was the dominant factor influencing dioxin emissions. Also, the data in docket item II-I-104 demonstrate that dioxin emissions and chlorine feed rate are unrelated. The commenters urge EPA to correct this discussion in the proposed rule.

Response: While influent chlorine did not affect D/F emitted at one kiln, EPA's contention that chlorine influent *may* affect D/F emissions is valid. The EPA agrees that APCD inlet temperature is the dominant factor, but not the only factor. D/F formation mechanisms are complex and not totally understood. It is believed that only very low amounts of chlorine are necessary for reaction with hydrocarbons to form D/F. Additional chlorine may not result in additional D/F formation.

13. Seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) provided Exhibit 12, the June 17, 1997 CKRC comments on EPA's HWC MACT NODA, which explains why the CKRC believes that activated carbon injection is not proven, cost effective, or justified as a BTF technology for mercury or dioxin/furan control in cement kilns.

Response: The EPA examined the commenters' analysis and does not necessarily agree with their conclusions. However, both EPA and the commenters concluded that activated carbon injection was

not a cost effective BTF control technology for NHW kilns. The EPA reconsidered the use of carbon injection for control of D/F and mercury emissions from HW kilns and decided not to base a standard on the use of carbon injection as a BTF control for HW kilns.

14. Seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) support the Agency's conclusion to not use activated carbon injection as a BTF technology for dioxin/furan or mercury control at cement kilns. This appropriate conclusion should apply to all cement kilns regardless of the type of fuel used.

Response: The EPA acknowledges support for the decision to not go BTF for NHW kilns. The EPA reconsidered the use of carbon injection for control of D/F and mercury emissions from HW kilns and decided not to require carbon injection as a BTF control for HW kilns.

5.3.3 Comment: The following comments concern the health risks from dioxin/furan emissions.

1. One commenter (IV-D-15) stated that no data were presented in the proposed NESHAP to demonstrate that the dioxin/furan standard would reduce dioxin/furan emissions and reduce health risk. Lowering the stack exit temperature would increase ground level concentrations and increase health risk. One commenter (IV-D-15) suggested that plants that cannot meet the dioxin/furan emission limit be allowed to demonstrate an acceptable health risk assessment (HRA) as an alternative to implementing dioxin/furan control techniques. The HRA would provide another option for plants that have favorable stack parameters, meteorology, terrain, and/or other factors that

influence dispersion.

2. One commenter (IV-D-20) stated that EPA cited the 1994 Great Waters Report to Congress instead of the EPA Dioxin Report to Congress (that was criticized for its toxicity conclusions).

3. One commenter (IV-D-20) noted that EPA is concerned over dioxin/furan emissions due to their persistence in the environment, potential to bioaccumulate, and toxicity. However, published scientific papers note the potential for photodegradation and cement kiln deposition studies[12] failed to support EPA's contention of persistence in the environment.

4. One commenter (IV-D-20) stated that no docket item is referenced for the statement on p. 14197 that there is "a high toxicity associated with even low masses of" dioxins. The Science Advisory Board criticized the EPA Dioxin Report to Congress for the toxicity conclusions.

Response: The preamble of the proposal presented an estimate of the national baseline D/F emissions and the emissions reductions as a result of achieving the standard. The D/F control technology upon which the standard is based is temperature reduction and proper combustion. Rapid quench inhibits D/F formation. Although stack temperature will affect dispersion of stack gases, if the D/F is not formed it will not be dispersed. Section 112 authorizes the development of technology based standards.

MACT standards are based on the technology in use at the best controlled facilities. Risk is not considered in determining this technology. The Act recognizes the high

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[12] Food Chain Pathway Analysis for CKD Constituents at Continental Cement, Hannibal MO, prepared by Gossman Consulting, Inc., 6/26/98.

toxicity of 2,3,7,8 TCDFs and 2,3,7,8 TCDD in section 112(c)(6). Residual risk will be addressed in accordance with section 112 (f)(2) within 8 years following promulgation of these standards.

The two EPA reports (the 1994 Great Waters Report, and the Health Assessment for 2,3,7,8-Tetrachlorodibenzo-p-Dioxin and Related Compounds) that the commenter refers to were developed at approximately the same time. For this reason, the discussion of toxic effects of chlorinated dibenzodioxins and furans is generally consistent between the two documents. Either report can reasonably serve as the supporting citation for the health effects description, which remains EPA's current interim position on dioxin. Criticisms of the Health Assessment document are discussed below.

The extremely high toxicity of chlorinated dibenzodioxins and furans, relative to other environmentally relevant toxic substances, is generally recognized by the scientific community. EPA summarized this issue in the 1994 *Health Assessment for 2,3,7,8-Tetrachlorodibenzo-p- Dioxin and Related Compounds*, which states,

> "Much of the public concern for this potential exposure revolves around the characterization of these compounds as among the most toxic "man-made" chemicals ever studied. These compounds, which are generally unwanted by-products of chemical reactions, are extremely potent in producing a variety of effects in experimental animals based on traditional toxicology studies at levels hundreds or thousands of times lower than most synthetic chemicals of environmental interest."

In its September, 1995 review of the Health Assessment, the Science Advisory Board (SAB) made the following comments and recommendations about the dose-response sections of the report:

1. A commendation of EPA for its comprehensive review of the scientific literature on the biological mechanisms involved in the uptake of dioxin and related compounds, the binding of these agents to receptor sites, their metabolism and retention in tissues, and to biological response at the cellular, organ, organ system, and whole body levels;

2. A recommendation for relatively minor changes to sharpen and clarify this review. The most significant of these concerned clarifications in EPA's use of toxicity equivalence factors to address the broad range of dioxin-like compounds that bind to the Ah receptor, and produce related responses in cells and whole animals;

3. A recommendation that EPA's dose-response modeling be clarified and expanded to consider models other than EPA's default linear non-threshold model for carcinogenic risk;

4. Concurrence with EPA's conclusion that dioxin, under some conditions of exposure, is likely to increase human cancer incidence, but a recommendation that a more qualified description be considered for certain other dioxin-like compounds.

EPA's current plausible upper-bound estimate (recommended by the 1994 Health Assessment) for the carcinogenic potency of ingested 2,3,7,8-tetrachlorodibenzo-p-dioxin is 0.01 picograms per kilogram body weight per day. This potency is more than 400 times greater than that of the next most potent carcinogen (benzidine) assessed by EPA. On this basis, the generality,

“there is a high toxicity associated with even low masses of dioxins,” is accurate. Although EPA’s ongoing revisions to the 1994 Health Assessment may result in adjustments to the carcinogenic potency estimate, EPA believes that the accuracy of the generality will not change.

5.3.4 Comment: One commenter (IV-D-20) made the following remarks concerning docket item II-B-57 (Memorandum, E. Heath, RTI to J. Wood, EPA:ESD:MICG, September 21, 1995, Conversion of dioxin/furan toxic equivalent to total congener emissions for cement kilns.)

1. The purpose of docket item II-B-57 is to tie the toxic equivalent (TEQ) value to a total dioxin/furan value. This is consistent with similar efforts in the 1994 Dioxin Report.

Response: The purpose of docket item II-B-57 was simply to evaluate the TEQ values and compare these with the total congener values, and not to develop a factor to "tie the two together".

2. Not all dioxin/furan congeners are toxic (several have toxic equivalency factors of zero) and these are the congeners most likely to be emitted by cement kilns.

Response: The EPA agrees that not all congeners have the same toxicity. The commenter provided no data to support the

statement that the least toxic congeners are those most likely to be emitted by cement kilns.

3. The mixture of emitted congeners varies among cement plants and this is indicated by the wide ratio of TEQ vs. total dioxin concentrations in docket item II-B-57.

Response: The EPA agrees with this comment.

4. The EPA attempted to relate toxic equivalent (TEQ) values to total dioxin/furan congeners in docket item II-B-57. The commenter stated that since it could be

possible to meet an emission limit of 0.2 ng TEQ/dscm @ 7 percent oxygen and fail a total dioxin emission limit, or pass a total dioxin limit but emit more than 0.2 ng TEQ/dscm @ 7 percent oxygen, EPA's effort could be construed as an attempt to pull in all other dioxins by using TEQ rather than just 2,3,7,8-TCDD or 2,3,7,8-TCDF as authorized in the Clean Air Act.

Response: The D/F emission limit is expressed in the format of TEQ; there is no D/F emission limit based on total congeners. The TEQ format was used to maintain consistency with the D/F standards for HW kilns.

5. The ratio of emissions of total D/F congeners to emissions of TEQ ranging from 8 to 2,800, the data cannot and should not be used to make even the "crude" estimate presented in docket item II-B-57.

Response: The EPA agrees that there is a wide range in ratios of total D/F to TEQ. The purpose of docket item II-B-57 was to evaluate the TEQ values and compare these with the total congener values, and not to develop a factor to convert between the two. Estimates of D/F emissions were based on actual TEQ values and were not based on converting total D/F congeners to TEQ with a conversion factor.

5.3.5 Comment: One commenter (IV-D-20) made the following remarks concerning docket item II-E-30 (Telecon and attachment, J. Wood, EPA:OAQPS:ESD:ISB, to docket, July 11, 1994, Telephone conversation with Jim Kilgroe, EPA:ORD, regarding dioxin/furan formation in cement kilns. Attachment: information on PCDD/PCDF formation and control).

1. Docket item II-E-30 is not specifically cited in the proposed rule.
2. No specific cement kiln data are discussed.
3. The document is incomplete. Figures mentioned in the

text are not included. There is no bibliography corresponding to the references in the text.

4. According to docket items II-E-30 and II-I-79, carbon content of the flyash is very important in dioxin/furan formation theories in that the formation increased with the carbon content of flyash. This might account for the Continental Cement report[13] that showed dioxin/furan formation rates increased when carbon injection was tested at their facility. Yet, the EPA has proposed carbon injection as a dioxin/furan control technology.
5. Docket item II-E-30 states that "It is postulated that Cl ... is largely responsible for dioxin/furan formation in MWCs but there is no conclusive evidence that this is true." Gossman Consulting, Incorporated has examined data from a number of cement kilns and has not seen a correlation between hydrogen chloride or chlorine flue gas concentration and dioxin/furan emission rates.
6. The EPA research on de Novo reaction temperatures (described in docket item II-E-30) and the data listed in Table 1 (in docket item II-B-78) support a preferred APCD inlet temperature 500°F (instead of EPA's selection of 400°F) to control dioxin/furan formation.
7. Data from cement kilns does not demonstrate an "exponential" increase (or decrease) of dioxin/furan emission with ACPD inlet temperature that was noted for MWCs (in docket item II-E-30).

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[13] Dioxin Emissions - Cement Kiln Operations, Robert Schreiber and William Winders, Proceedings of the International Specialty Conference for Waste Combustion in Boilers and Industrial Furnaces, Kansas City MO, March 1995, p. 157.

8. The dioxin/furan formation mechanisms described in docket item II-E-30 are in no way generally applicable to cement kilns. Cement kilns do not have "flyash carbon." A number of causes for flyash carbon simply do not exist or occur in cement kilns: "rapid changes in critical waste properties," "variations in heating content, volatility, and moisture," "amount and distribution of combustion air," and a number of other conditions wholly applicable only to incinerators, particularly MWCs.
9. The footnote to the definition of good combustion practice (GCP) (in docket item II-E-30) appears to be the underlying concept for the proposed dioxin/furan control. Without "flyash carbon," EPA's theoretical justification for the preferred APCD inlet temperature of 400°F (to control dioxin/furan formation) has no foundation.

Response: The rule does not require the use of ACI for NHW kilns. Sources may use whatever technology that is effective to decrease their emissions to the level of the MACT standard.

Kilns demonstrating compliance with the 0.2 standard at 500° F are permitted to operate at this temperature.

The 400 °F basis for the D/F emission limit is supported by experimental evidence as is indicated by the nearly all of the test data presented in the proposal preamble, Table 8. Proper combustion is also a basis of the MACT floor.

Docket item II-E-30 was not cited in the preamble because EPA based its floor and BTF decisions on the available test data from cement kilns. Further, the item in question did not serve as a basis for making the MACT floor determination, and was included in the docket only as background information on the theories of D/F formation.

5.3.6 Comment: One commenter (IV-D-20) made the following comments concerning docket item II-B-78 (Memorandum, E. Heath, RTI, to Joe Wood and K. Durkee, EPA:OAQPS:ESD:MICG, November 26, 1996, Summary table of National impacts for the portland cement MACT standard).

1. Docket item II-B-78 is cited to support the temperature effect on dioxin/furan emissions. In the document, much of the temperature data are actually stack gas temperatures rather than PMCD inlet temperatures. In general, this means that many of these temperatures may actually be 50°F to 100°F hotter at the PMCD inlet.

Response: Due to limitations on data collected in emission tests, APCD inlet temperatures were not always available. The EPA has considered the difference between stack and APCD inlet temperatures in developing the standard, as noted in the proposal preamble.

2. In order to demonstrate a direct linear "temperature dependence" for dioxin/furan emissions, the data would have to include several tests at the same facility operated using the same feeds in the same manner but a several different APCD temperatures. Clearly, this has not been done.

Response: At least ten commenters supported the temperature limit as a method of limiting D/F emissions. The EPA evaluated the effect of temperature on D/F emissions as described in the response to comment 5.3.2.5. The EPA believes there is a temperature dependence, but not necessarily a linear one.

3. With regard to Table 1, there is virtually no difference in the percent of data that exceed 0.2 ng/dscm for the 301°F to 400°F and 401°F to 500°F temperature intervals. Consequently, the data do not support that dioxin/furan emissions are dependent on

temperature alone.

Response: The EPA does not assert that D/F formation is solely dependent on temperature. The MACT floor is also based on proper kiln combustion and operation.

4. There are no data to support the caveat that "proper kiln and control device operation and efficient fuel combustion" are needed in addition to control of the temperature at the inlet to the APCD (in order to control dioxin/furan emissions). Indeed, on page 8, EPA states that the Lehigh kiln "low emission (0.37 ng TEQ/dscm) cannot be explained as no detailed information was available..." and yet EPA attributes the high emission (1.2 ng TEQ/dscm), for the other Lehigh test, to poorly controlled tire combustion/kiln operation since three other NHW kilns emitted less than 0.2 ng TEQ/dscm while burning tires. No other proof is offered but this comparison for the Lehigh data.

Response: Sources may use whatever technology they choose to meet the 0.2 or 0.4 limit. Although no information is available to characterize the combustion regime at Lehigh, as noted in the proposal, the data showed that switching fuels affected the D/F emission level. This is an indication that proper fuel combustion played a role in D/F formation and control. The data were presented in the preamble in the interests of completeness. Furthermore, combustion studies conducted on other processes, including fossil fuel fired boilers, indicated that incomplete combustion leads to greater D/F formation. Poor process control leads to inefficient combustion with resulting increases in combustion based D/F emissions.

5. Docket item II-B-78 has not provided sufficient reason via examination of the data to justify the statement:

"...clearly show temperature reduction to 400°F at the inlet to the PMCD ... will reduce D/F emissions to 0.2 ng TEQ/dscm...." Nor was any data provided that would support the contention that Lehigh's high D/F emission rates are the result of "poorly controlled tire combustion/kiln operation."

Response: Sources may use whatever technology is appropriate to meet the 0.2 limit. The data indicated that the 0.2 level could be met by most if not all kilns with tempertatures below 400 F; the datapoints that did not indicate this were explained in the proposal preamble. No information is available to characterize the combustion regime at Lehigh. The data were presented in the preamble in the interests of completeness. In the proposal, EPA acknowledged that it cannot explain the Lehigh data, and for this reason, has allowed for the 2nd tier emission limit of 0.4 ng/dscm and 400 °F.

6. The data presented in docket item II-B-78 do not strictly support EPA's contention that the highest dioxin/furan emissions occur at the highest temperatures and the lowest dioxin/furan emissions occur at the lowest temperatures. Additionally, EPA later states that there is no explanation for some data. The linear relationship between dioxin emissions and inlet APCD temperature has never been demonstrated. What EPA suggests is a gross over generalization which even their data does not support.

Response: At least ten commenters supported temperature control as the basis for limiting D/F emissions. The EPA does not assert that there is a direct linear temperature dependence. The EPA does not assert that D/F formation is solely dependent on temperature, as is indicated by Docket item II-I-85. However, the data clearly show that D/F emissions are dependant on

temperature. Further, the EPA acknowledges that some kilns may meet the D/F standards at temperatures well above 400 F.

7. The data in docket item II-B-78 use single data points without taking into account all of the variables at each facility.

Response: The EPA recognizes the inherent variation in precision and accuracy in emission testing and this precision and accuracy is inherent in the database upon which the limits are based. The EPA has considered this in establishing the 0.2 limit and the alternative of the 0.4 limit with temperature control.

8. The EPA's contention that all kilns were at or less than 0.2 ng TEQ/dscm below 340°F is not completely true based on the data in docket item II-B-78.

Response: The EPA acknowledged in the preamble to the proposal that there was one data point that exceeded 0.2 at temperatures below 340 °F, and discussed the data point.

9. The EPA's dioxin/furan data consists of 19 emission results from 15 different kilns. The Portland Cement Association (PCA) and its members have more data which has been provided to EPA.

Response: All NHW kiln data available at the time of proposal for which stack or APCD inlet temperatures were available were evaluated and added to the project docket. As shown below, the PCA emissions data summary (docket item II-D-195) contained more data points over a wider range of emissions. The PCA data summary was not used since EPA did not have a copy of all of the test reports used to derive the PCA summary. Data provided by the PCA emissions data summary do not lead to the establishment of a different MACT floor technology or emission limit.

	D/F TEQ (ng/dscm at 7 percent oxygen)			
data source	mean	minimum	maximum	no. of points
PCA (docket item II-D-195)	0.23	0.00003	3.1	41
EPA (docket item II-B-78)	0.20	0.0009	1.0	19

5.3.7 Comment: Remarks by one commenter (IV-D-2) on the dioxin/furan stack emissions data are noted below.

1. All of the data presented in Table 8 of the preamble were checked. There were numerous differences with the PCA quality check. The only data that matched with the PCA check were for the Lone Star Greencastle and Lone Star Oglesby sites. Higher and lower results were noted, but the majority of the EPA data were somewhat higher than the PCA checked data. The Lehigh Union Bridge and Holnam Clarksville data are all high. Instead of 0.37, 1.2, and 1.0 ng TEQ/dscm at seven percent oxygen, the PCA checked corresponding numbers are 0.19, 0.83, and 0.69. It is possible that in some instances the alternative, and more accurate, determination of 2,3,7,8-TCDF was not extracted and utilized from the raw analytical data. Another common error seen in the past has been double corrections for oxygen. While the data did not change enough to impact EPA's primary conclusion, the commenter believes that accurate and consistent reporting of dioxin/furan data for the cement industry should be an important aspect of the proposed NESHAP. The EPA should include a set of data that is as comprehensive as possible and that all data be carefully reviewed to insure that proper

calculations of TEQ and oxygen correction have been made. Gossman Consulting, Incorporated is prepared to work closely with EPA in this effort.

2. It appears that EMPC values were erroneously used (in a number of instances) in calculating TEQ values. This conflicts with current EPA guidance provided in SW-846 Method 8280A (December 1996).

3. The EPA has a tendency to assign good operating or poor operating conditions to emissions data that supports their contentions. Lower emissions at one temperature and higher emissions at another does not automatically make better combustion conditions. A reliable definition of "good combustion" conditions needs to be developed. The EPA has expressed similar unsupported ideas in other regulations as well.

Response: EPA appreciates the review of the data by the commenter. EPA agrees with the commenter that industry's data analysis does not change EPA's primary conclusion, and agrees that accurate and consistent reporting of dioxin/furan data for the cement industry should be an important aspect of the NESHAP. The TEQ data presented, and used in the determination of the MACT floor emission limit, were derived in accordance with the Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and -Dibenzofurans (CDDs and CDFs) and 1989 Update (Docket item II-A-8), which is consistent with the TEQ definition in the rule.

Good combustion practice when applied with temperature control will result in the emission of less D/F. The standard does not limit a source's flexibility in controlling operations as a means to demonstrate compliance with the D/F standard. The EPA realizes that kilns may meet the 0.2 ng/dscm standard at temperatures higher than 400 degrees. See the response to

comment 5.3.6.4.

As discussed in the test report in docket item II-D-119, EMPC values are estimated when (1) "there is a slight peak on the chromatogram at the expected location for that compound, but the peak height is below the established limit of detection." This the slight peak is within the background noise but is noticable. The EMPC values were also estimated when "a peak or peaks occur very near the expected location, but their retention time(s) is (are) not exactly correct; in these cases, the maximum possible concentration is reported in the table (as if the peaks represented the expected compound)." Since the analyst made the effort to estimate a concentration instead of writing it off as non-detected concentration, the EPA used EMPC values.

A number of field blanks contained D/F congeners but at levels below those in the samples. The EPA did not blank correct such data.

The EMPC values were used and the majority of the EPA data were somewhat higher than the PCA checked data. Since the EPA and PCA-checked data did not differ enough to impact the EPA's primary conclusion, the EPA will not revise the data.

Good combustion is sometimes defined by a THC and/or carbon monoxide emission level. However, these pollutants may not be good indicators of good combustion for a cement kiln, since they may originate from the feed materials. The final rule does require an annual inspection of the combustion system.

5.3.8 Comment: Remarks by one commenter (IV-D-20) on docket item II-B-73 (Memorandum, E. Heath, RTI, to J. Wood, EPA:ESD:MICG, August 23, 1996, Number of wet and dry non-hazardous waste (NHW) kilns that could meet the NSPS PM limit and achieve a control device temperature below 400 degrees F) follow.

1. The data in docket item II-B-73 is not sufficiently detailed to comprehensively support the EPA statement

that "50 percent of existing PMCDs used at ... NHW kilns operate with a maximum inlet PMCD temperature of approximately 400°F. It is not clear whether some of the different inlet temperatures per kiln are actually the inlet temperature for just one stack. Also, no inlet temperatures are listed for ten lines of data.

2. If the data were removed for 400°F kilns, for it is not clear that these kilns could routinely stay at or below 400°F, the percentage of kilns that operate at approximately 400°F drops from 50 percent to 36 percent (for 39/109 inlet temperatures.

Response: The impact estimates were based on the best available data. In estimating the number of kilns requiring additional D/F controls, the percentage of kilns for which we had data that were operating above 400 F was determined and then used to extrapolate impacts for the entire industry. For additional details see the response to comment 4.3.4 in section 4.

5.4 Selection of Emission Limits: THC/Organic HAPs

5.4.1 Comment: The following comments were made on the proposed THC emission limit.

1. One commenter (IV-D-15) stated that the proposed rulemaking provides no justification for the selection of 50 ppmvd as the total hydrocarbon (THC) standard for new or modified kilns.

2. One commenter (IV-D-16) noted that EPA should have set the THC emission standard for existing kilns and in-line kiln/raw mills to not less stringent than 0.6 ppmvd, based on the average emissions achieved by the best performing twelve percent of existing sources for which the Administrator has emissions information. If EPA believes that this emission number is not representative of the portland cement manufacturing

category, it must use its authority under section 114 to obtain representative data.

3. One commenter (IV-D-16) noted that EPA has recognized that portland cement kilns use a variety of methods and technologies to control their THC emissions, including precalciner/no preheater technology and a combination of feed material selection, site location, and feed material blending. All of these methods and technologies are reflected in existing sources actual performance, on which EPA must base the floors for its THC standard. As a result, EPA must establish a THC emission limit based on the performance of the best performing twelve percent of sources for which EPA has available data.

4. According to one commenter (IV-D-16), under section 112(d), the THC emission standard for new sources must not be less stringent than 0.4 ppmvd, a level of control more than one hundred times better than the proposed standard for new sources of 50 ppmvd. If EPA believes that this emission number is not representative of the emission control that was "achieved in practice by the best controlled similar source," it must use its authority under section 114 to obtain representative data.

Response to issues 1 through 4: The final rule has been changed to make the THC limitation applicable only to greenfield kilns, greenfield in-line kiln/raw mills, and greenfield raw material dryers. Greenfield sites are sites that commenced construction after March 24, 1998, where no kilns, no in-line kiln/raw mills, and no raw material dryers were in operation at any time prior to March 24, 1998. New and reconstructed kilns at existing sites, as well as existing kilns are not subject to THC

limits. Such affected sources would be unable to apply the MACT technology, i.e., site selection adjacent to feed materials with relatively low levels of naturally occurring organics, as a means to limit THC emissions.

With regard to the level of the standard, it is based upon data available to the Administrator and no data were provided after proposal which would justify a different standard. Based on EPA's data and data provided by the PCA (docket items II-B-62, II-B-75, and II-D-195) it was established that a THC limit of 50 ppmvd represents a level that is achievable nationwide across the broad spectrum of feed materials. This level has been retained in the final rule.

Technologies such as the "precalciner, no preheater" kiln do not provide the maximum achievable control technology when other considerations such as energy impacts and NO_x emissions are taken into account. As explained in the preambles to the proposed and final rules, EPA believes that use of these technologies would not be MACT because of the adverse environmental impacts associated with these technologies' use, in particular sharply increased emissions of certain criteria pollutants. [See Portland Cement Assn v. Ruckelshaus, 486 F. 2d 375, 385-96 (D.C. Cir. 1973) (if use of a particular technology results in other,adverse environmental consequences, that technology need not be considered the "best".)]

With regard to the use of section 114 authority, see response to comment 5.2.5.3.

5. Three commenters (IV-D-22, IV-D-24, and IV-D-25) stated that EPA correctly exempted existing facilities from the requirement to switch raw materials to control THC emissions. One commenter (IV-D-22) stated, however, that EPA did not recognize that reconstructed facilities are essentially upgraded and improved existing facilities that should also not be required to

switch raw materials. Two commenters (IV-D-24 and IV-D-25) noted that EPA's justification for its actions also apply for HW kilns that are subject to a different standard under the HWC rule and questioned why NHW and HW kilns must meet different THC emissions standards.

Response: Comments on HW kilns have been referred to EPA/OSW. The final rule has been changed to make the THC limitation applicable only to greenfield kilns, greenfield in-line kiln/raw mills, and greenfield raw material dryers. New and reconstructed kilns at existing sites are not subject to THC limits. Such affected sources would be unable to apply site selection (and consequent initial siting to obtain low organic feed materials) as a means to limit THC emissions.

6. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) agreed that EPA properly decided to not establish a THC MACT standard for existing kilns or in-line kiln/raw mills. One commenter (IV-D-23) stated that there is no existing floor technology and the potential BTF technology, a precalciner without a preheater, is inappropriate for existing and new cement kilns or for in-line kiln/raw mills.

Response: The EPA acknowledges support for the decision not to regulate existing kilns for THC.

7. Two commenters (IV-D-24 and IV-D-25) questioned why there are differences in the THC standards for cement kilns that burn and do not burn hazardous waste. The rationale for the standards for NHW kilns are equally true for HW kilns.

Response: Comments on the proposed HWC rule will be answered as part of that rulemaking. Based on data from NHW kilns, the EPA determined that the numerical limit equivalent to

the MACT floor technology represents a level that is achievable nationwide across the broad spectrum of feed materials available to new greenfield kilns. Also see response to comment 1.5.

8. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) urge EPA to not impose the proposed THC standard on reconstructed kilns and noted that EPA's proposed THC standard for new sources could:
   a. restrict reconstruction of existing kilns
   b. force reconstructed kilns to install an inappropriate technology (e.g., precalciner without a preheater)
   c. force plants to acquire alternative raw material supplies (which would be cost prohibitive[14]).

Response: The EPA has not asserted that a precalciner/no preheater configuration is the MACT floor technology for new sources. The final rule has been changed to make the THC limitation applicable only to greenfield kilns, greenfield in-line kiln/raw mills, and greenfield raw material dryers. New and reconstructed kilns at existing sites are not subject to THC limits. Such affected sources would be unable to apply site selection as a means to limit THC emissions.

9. Commenter (IV-G-5) stated that the THC limit for new plants is inappropriately based on site selection for the following reasons.
   a. Site selection is not an "emission standard." No plant in the U.S. chose its location for the purpose of minimizing THC emissions, so it cannot accurately be said that site selection is a

[14] Attachment C to docket item IV-D-26: Analyses of Selected Issues Contained in Proposed Portland Cement Manufacturing NESHAP, prepared by Penta Engineering Corporation, June 1998.

control technology. Therefore, it cannot be said that choosing a low-organic site is "the emission control that is achieved in practice by the best controlled similar source (CAA section 112(d)(3)). The THC emission measurements in EPA's database are a function of happenstance, not "control." The best controlled source may have higher THC emissions because of its location. Different plants fed with the same material will emit THC at different rates. Therefore, site selection can hardly be called an emission standard.

b. Site selection may not be considered as a MACT option according to section 112(d)(2)(A)-(E) of the CAA. The EPA may consider substitution of materials but in the statutory listing of material substitutions, Congress clearly was not referring to situations where nature provided the raw materials. (For instance, a solvent containing lower VOCs could be substituted for a higher one.)

Response: The CAA does not limit material substitution to a particular subset of materials, since the language in CAA section 112(d)(2)(A) (“eliminate emissions of such pollutants through process changes, substitution of materials or other modifications”) is unqualified. Nor is motivation relevant in determining whether a particular practice controls emissions of HAPs. The issue involves selection of feed materials with low kerogen or bitumen content to reduce THC emissions. In any case, docket items II-B-47, II-B-78, and II-E-27 mention efforts that cement manufacturers have undertaken to control THC emissions (that were attributed to kerogens in the raw material feed). One site reportedly purchased shale for use as a portion of their kiln feed to reduce organic emissions.

The final rule has been changed to make the THC limitation applicable only to greenfield kilns, greenfield in-line kiln/raw mills, and greenfield raw material dryers. The EPA agrees that only greenfield sources would be able to apply MACT, which is the site selection of feed materials with low levels of naturally occurring organic material. The EPA considered the use of precalciner/no preheater kilns for THC control, (docket items II-B-47, II-B-48, II-B-67, and II-B-76), but concluded that because of negative energy impacts and increased emissions of criteria pollutants, this did not constitute MACT for either existing or new sources.

c. The proposed rule does not address the costs or incidental environmental impacts (as required in section 112(d)(2)) of delimiting available sites. The costs of a site selection decision (based on the organic content of the available limestone) was not considered in the proposal, even though these costs may be considerable. In fact, the proposed rule assumes that new sources do not incur costs associated with site selection (per docket item II-A-46). This assumption and the conclusion drawn from it are without support. There are obvious costs for: further raw material or product transport distances from the new location, monitoring, increased potential roadway accidents (with increased transport distances), and incidental environmental impacts, such as increase mobile source emissions due to higher transport distances, or the possibility that a low-organic limestone may yield higher emissions of another substance (such as pyritic content yielding higher potential sulfur dioxide emissions).

Response: The final rule requires compliance with the THC emissions limit for new kilns, in-line kiln/raw mills, and raw material dryers at greenfield sites. Each owner/operator may decide how to best meet the THC limit for new greenfield sources. This may include siting considerations or process controls. It was assumed that a greenfield plant would be sited adjacent to feed materials with acceptable levels of organic material, and therefore the environmental impacts and costs associated with transport noted by the commenter do not apply. Further, the costs of site selection were not included since these would be incurred by a greenfield site regardless of THC considerations.

d. The increased costs and risks of restricting site selection are likely to outweigh the costs and risks associated with THC emissions from new cement plants. According to EPA's worst-case risk assessment (in docket item II-B-70), the lifetime individual risk is eight in one million. The commenter speculates that moving a portland cement plant even a few miles from its ideal location would increase risks greater than that, and at considerable economic cost.

Response: The docket item cited was a non-site-specific exposure assessment. MACT standards are technology based and the MACT floor is not based on risk considerations. The commenter does not provide any data or explanation as to why risk or cost would increase with the siting of a greenfield plant adjacent to "clean" feed materials. See the previous response to comment (5.4.1.9c) for why no THC control costs are incurred.

e. The chosen THC emission limit is not properly supported by the emissions data that are extremely limited in plants monitored (14 tested out of 100 plants) and methods used (Method 25A over a few

hours period). The EPA does not have any data from CEMs that meet Performance Specification 8A, which has not yet itself been adopted).

Response: The standard has been based on information available to the Administrator, and applies only to new greenfield facilities. The emission limit was based on Method 25A data, which is a test method utilizing the same type of instrument for which PS-8A was developed. PS-8A will be finalized with the HWC MACT standards. See the response to comment 5.4.1.1-4 above.

f. Based on EPA's THC emissions data, six out of fourteen locations would violate the proposed THC standard. The number of failing plants within that limited source population would grow if the period of emissions measurement were longer. Thus, about fifty percent of the available sites could be closed, perhaps including all sites in certain markets. The record does not support the assumption that site selection is feasible.

Response: The final rule has been changed to make the THC limitation applicable only to greenfield kilns, in-line kiln/raw mills, and raw material dryers. Operators of new kilns, in-line kiln/raw mills, and raw material dryers at greenfield sites may use site selection or other means such as process design to meet the THC limit.

10. Commenter (IV-G-5) noted that the kiln THC limit does not include an averaging time in section 63.1343(c)(4). For consistency with the compliance test methodology, an averaging time of three hours should be added to this section.

Response: A thirty day block averaging time has been selected in recognition of the lag time involved in using up

inventory in feed storage and replacing it with a different quality of material. This requirement is noted in the rule.

5.4.2 Comment: Comments on correlations between organic HAP and THC emissions are noted below.

1. One commenter (IV-D-15) stated that the proposed NESHAP provides no data to correlate expected organic HAP emission reductions with the proposed THC limit.
2. One commenter (IV-D-20) noted that EPA's nine data points on the organic HAP content in THC ranged from one to ninety-eight with an average of 23 percent. The numerical average is clearly not representative of the data. Commenter (IV-D-23) stated that the estimated factor of 23 percent organics in THC is flawed and needs to be corrected. Commenter (IV-D-25) questions the validity of THC as a surrogate for organic HAPs.
3. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA proposes to use THC as a surrogate for organic HAPs without first demonstrating a statistically significant relationship between THC and organic HAPs. The commenters also stated that establishing a correlation between organic HAPs and THC emission concentrations should be based upon the following types of information. The commenters noted that there may be other factors they have not mentioned. None of the following information was contained in docket A-92-53.
    a. Air emissions data for organic HAPs and THC should be obtained simultaneously at a representative cross-section of the regulated sources (in order to establish the variability between kilns).
    b. Multiple sets of air emissions data should be

obtained at the same kiln for a number of plants (in order to establish the variability per kiln).

c. Statistical analyses should demonstrate at a reasonable level of confidence that there is a direct association between organic HAPs emissions and THC concentrations at the sources tested. No such analyses were found in docket no. A-92-53.

d. Statistical analyses should demonstrate that the variability of the relationship between organic HAPs and THC remains within reasonable tolerance intervals for a major portion of the population of sources.

e. Process analyses and physical and chemical data that demonstrate that there is a sound technical basis for concluding that the concentrations of organic HAPs and THC are directly associated.

4. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that the 23 percent fraction (of organic HAPs in THC emissions) should not be used because the procedures used to derive it are significantly flawed for the following reasons.

a. Method 25A total hydrocarbon concentration data cannot be compared with FTIR hydrocarbon concentration data.

b. The FTIR and Method 25A data set used to calculate the 23 percent factor is very small and not necessarily representative of NHW kilns.

c. The factor depends significantly on 83 percent and 98 percent organic HAPs/THC ratio values from the Union Bridge Maryland plant test of October 1995. The THC levels measured at the plant are very low, well below the average value of 20 ppmvd at seven

percent oxygen found by PCA and the 35 ppmvd at seven percent oxygen value claimed by EPA in reviewing a relatively small data set. The two measurements from the Union Bridge 1995 tests are clearly outliers that should not be averaged with the other data. Removal of the unrealistically high value from the other ratio data shifts the average ratio value from an extremely high value of 26 percent to an average ratio value in the range of 1.7 to 9 percent.

d. It is inappropriate to take a high fractional organic HAPs level for a source with very low THC emissions and use this value to calculate the organic HAPs fraction for kilns having typical THC concentrations.

e. The basis of the 23 percent factor is docket item II-B-75. Apparently there were only nine emissions tests (in the docket item), a very small fraction of the total cement kiln population, that ranged from 0.4 to 224 ppmvd at seven percent oxygen. These nine tests are not likely representative of the entire population of cement kilns.

f. There is no information provided in the air emission test report that is consistent with the 7 and 9 ppmvd at seven percent oxygen concentration value listed in docket item II-B-75.

g. Based on an industry analysis (in Attachment B[15] to docket item IV-D-26), (a) the dominant organic

[15] Compilation of Cement Industry Air Emissions Data for 1989 to 1996, prepared by Air Control Techniques, P.C., September 1996.

compounds are non-HAP paraffins, (b) the concentrations of HAP compounds are low in all of the tests, and (c) the ratio of organic HAPs is well below EPA's factor of 23 percent.

5. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that rather than develop questionable factors, such as 23 percent, the total emissions of organic HAPs should be estimated by using the speciated concentration data for each specific kiln tested multiplied by the average gas flow for the kiln. This would provide mass emissions data that could then be used to estimate organic HAP emissions for the entire cement industry.

Response: The EPA recognizes the variability of the data but concludes that when speciated analyses of THC from cement kilns were undertaken, organic HAPs were found to be present. No attempt was made to correlate organic HAP emissions with THC emissions. Because of the cost savings to the industry in testing and monitoring THC emissions compared to speciated organic HAP emissions EPA has adopted THC as a surrogate. Further, since the source of organic HAPs is the same source as for THC (feed materials), control of THC via MACT will also control organic HAP emissions. Adopting THC as a surrogate will result in cost savings to the cement industry and to the EPA during compliance testing and monitoring.

The use of 23 percent as the assumed amount of organic HAP in THC based on the average of the available data has no effect on the numerical emission limit for THC. The EPA acknowledges the variability of the data, and used the 23 percent value for the calculation of national impacts estimates. Further, the 23 percent value was not developed to be used as a site-specific

emission factor in lieu of source emissions testing.

The EPA notes further that the same issue was presented when EPA adopted standards for boilers and industrial furnaces burning hazardous waste, and in the course of that rulemaking, not only the Agency but the Science Advisory Board concluded that THC was indeed a reasonable surrogate for toxic organic emissions from cement kilns (among other combustion units). [See 56 FR at 7153-54 (Feb. 21, 1991).]

5.4.3 Comment: Comments on THC emission controls follow.

1. One commenter (IV-D-15) asked what kiln operators could do to lower THC emissions? Selection of suitable feed materials is almost economically impossible for existing plants. The quarry produces what the quarry produces. Over-firing the kiln with excess fuel would increase emissions associated with fuel consumption.
2. One commenter (IV-D-16) noted that the Agency has recognized that feed material selection and feed material blending are achievable measures that will reduce THC emissions beyond the floor requirements. Therefore, the EPA must require these measures as beyond-the-floor measures for both new and existing sources.
3. The APCA comments on the proposed HWC rule explain why it is difficult for mineral-based industries to switch raw materials. (The main issues are listed in the comments below).

Response: The final rule has been changed to make the THC limitation applicable only to greenfield kilns, greenfield in-line kiln/raw mills, and greenfield raw material dryers. The basis for the THC limit for new greenfield sources is site selection to ensure low hydrocarbon content in feed materials. (In the proposal, the THC limit applied to all new kilns, but

based on comments received, the rule has been changed such that the THC limit will only apply to new greenfield kilns, in-line kiln/raw mills, and raw material dryers.) As discussed in the proposal, this option is not available to existing (and new brownfield) kilns and in-line kiln/raw mills, in that facilities are generally tied to existing raw material sources in close proximity to the facility, so that raw material proximity (i.e., transportation cost) is usually a major (indeed, critical) factor in plant site selection. Operators of new kilns, in-line kiln/raw mills, and raw material dryers at greenfield sites may use site selection or other means such as process design to meet the THC limit.

4. Objections to the proposed THC standard for new and reconstructed kilns that use raw material substitution as the control technology follow.

a. Eleven commenters (IV-D-20, IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that Congress intended to prohibit EPA from requiring mineral reliant sources such as cement kilns from being subject to MACT standards that are based on raw material changes.[16]

Response: Section 112(2)(d)(A) of the Act specifically authorizes "substitution of materials or other modifications" as a means of reducing emissions. There are no qualifications to this language. It is true that the Conference Report to the Act notes that MACT for mineral processing and related processes is not to be based on substitutions or changes of raw material feedstocks. [H. R. Rep. No. 101-952, 101st Cong. 2d Sess. 339.]

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[16] See H.R. Conf. Rep. No. 101-952, at 339 (October 26, 1990) and pages 405 and 407 of Exhibit 6 in docket item IV-D-29

The Conference Report, however, is directly at odds with the statutory text and the actual statute must of course control in such circumstances. However, EPA has changed the final rule to impose the THC emission limit only on new greenfield sites as explained in earlier responses.

b. According to ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6), for reconstructed kilns, feed selection is no different than feed substitution. Raw material substitution would impose a significant burden on reconstructed kilns.

c. According to ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6), the EPA rejected requiring raw material feed selection as a THC control for existing sources but this applies equally to reconstructed kilns at existing facilities.

d. According to ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6), the standard would be a disincentive for companies to modernize existing plants. Modernizations are generally associated with improved energy efficiency, reduction in emissions of criteria pollutant and greenhouse gases, reduction or elimination of the need to dispose of CKD, and avoidance of employee and community dislocations.

e. According to ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6), the potential costs associated with raw material replacement are exorbitant.

5. One commenter (IV-D-23) stated that raw material

substitution should only be imposed on green field plants, where the company can chose a site which has raw materials that will meet the proposed standards.

Response to comments 4b-4e and 5: The final rule has been changed to make the THC limitation applicable only to greenfield kilns, in-line kiln/raw mills, and raw material dryers. Operators of new kilns, in-line kiln/raw mills, and raw material dryers at greenfield sites may use site selection or other means such as process design to meet the THC limit.

5.4.4 Comment: Remarks from one commenter (IV-D-16) on the need for specific organic HAP emission limits are listed below.

1. Since one kiln emitted 29 Mg/yr of benzene and 13 Mg/yr of chlorobenzene, it is likely that portland cement kilns, as a category, emit significant quantities of hexachlorbenzene. The EPA should determine how much hexachlorobenzene is emitted from cement kilns and assure that these emissions are subject to standards under section 112(d)(2) or 112(d)(4).
2. Total hydrocarbon (THC) is not a valid surrogate for organic HAPs if the actual HAP content of sources' THC emissions can vary from zero percent to ninety-eight percent. Therefore, EPA must, at a minimum, identify the organic HAPs that portland cement kilns emit in significant quantities and promulgate separate regulations for each such HAP. The EPA must list separate emission standards for the following pollutants (which EPA noted were emitted from one kiln in quantities above 10 tons/year): hexane, toluene, benzene, naphthalene, and chlorobenzene.
3. Although EPA recognizes that existing portland cement kilns emit hundreds of tons of organic HAPs, some of

which are known to cause cancer and other serious health problems, the Agency has proposed to do nothing to control those emissions. This is both illegal and reprehensible.

Response: The EPA determined that there was no MACT floor for existing sources, and BTF standards (based on precalciner/no preheater technology) were not cost effective and had adverse environmental impacts associated with use of the BTF technology, in particular increased emissions of certain criteria pollutants (docket item II-D-199). As a consequence, failure to promulgate BTF standards is not illegal. The standards for new greenfield kilns, in-line kiln/raw mills, and raw material dryers were based on the MACT floor for new greenfield sources and on the best information available to the Administrator. Control of THC via MACT will also control individual organic HAPs. Risk is simply not a factor evaluated in establishing the MACT floor. The EPA will address residual risk in accordance with section 112(f)(2) within 8 years following promulgation of these standards. See the response to comment 5.4.2.5.

The proposal preamble stated that POM, one of the seven pollutants listed in section 112(c)(6), would be regulated using THC as a surrogate. The final source category listing notice for section 112(d) rulemaking pursuant to section 112(c)(6) requirements shows the NHW kiln facilities portion of the portland cement source category to be a significant source of POM (63 FR 17838, April 10,1998). For this reason, and to control other THC HAPs, the final rule limits emissions of THC from new greenfield raw material dryers and new greenfield kilns and greenfield in-line kiln/raw mills at area sources as well as major sources.

5.5 Selection of Emission Limits: Hg

5.5.1 Comment: Comments on the proposed mercury emission

limit follow.

1. One commenter (IV-D-16) stated that EPA's mercury standard must be no less stringent than 0.75 μg/dscm, which represents the average emission limitation achieved by the best performing twelve percent of sources for which the Administrator has emissions information.
2. One commenter (IV-D-16) noted that the importance of promulgating a mercury floor standard is best illustrated by the variability and magnitude of mercury emissions, which varied from 0.6 to 83 μg/dscm, or by a factor of 138 from kiln to kiln. One kiln reportedly emits over one ton of mercury per year (representing almost one-fourth of the total mercury emissions from all 89 non-hazardous waste kilns). Under EPA's proposed rule, that kiln could continue to emit one ton of mercury annually because of the absence of a floor standard.

Response to 1 and 2: The EPA has determined that the MACT floor for mercury emissions for new and existing kilns is no control. The comment that EPA should simply take the average of the best 12 percent of reported mercury emissions ignores the fact that no control technique could be identified for the sites with the lowest mercury emissions. Without identification of a mercury control technique, a standard based on the best 12 percent of sources would not be achievable in practice. Since mercury emissions are uncontrolled, any plant’s mercury emission level could vary day by day. The EPA also determined that the BTF technology, activated carbon injection followed by a fabric filter, is not cost effective and has therefore not adopted emission standards.

3. One commenter (IV-D-16) noted that EPA's failure to propose any mercury emission limits for new and existing cement kilns violates sections 112(c)(6), 129, and 112(d) of the Clean Air Act.

4. One commenter (IV-D-16) stated that EPA has ranked portland cement manufacturing within the ninety percent aggregate in the mercury emissions inventory. However, EPA cannot meet the ninety percent target in section 112(c)(6) without subjecting portland cement manufacturing to 112(d) standards for mercury, because the remaining categories listed in the mercury-emission inventory account for less than ninety percent of aggregate mercury emissions.

Response to 3 and 4: Commenters have rearranged the language of section 112(c)(6) and as a result have misread the applicable requirements. Section 112(c)(6) neither requires EPA to acheive a 90 percent reduction in emissions, nor to specifically establish standards for mercury. In addition to suggesting that EPA achieve a level of reduction in mercury in order to be able to credit regulations, the comment suggests that standards called for by section 112(c)(6) are applicable to pollutants, rather than sources, and regardless of whether emission control technologies or practices for such pollutants are available or feasible. Nothing in the language or structure of section 112 supports this result, however. Rather, section 112(c)(6) states that "with respect to" the enumerated pollutants, EPA "shall . . . list categories and subcategories of sources <u>assuring that sources</u> accounting for not less than 90 per centum of the aggregate emissions of each such pollutant <u>are subject to standards</u> (underlining added)." We interpret this language to require EPA to assure that these categories are put through the MACT analysis and development process in the same

manner and to the same extent as other source categories, and that a standard need not be written that imposes particular control requirements for a particular pollutant. The result of this section is simply to place a higher standard on the Agency in terms of the number of categories or subcategories that must be assessed and subjected to the regulatory process for these pollutants relative to other HAP. That being so, we believe that the purposes and requirements of section 112(c)(6) have been satisfied. See also the response to comment 2.3.2.1.

The EPA has considered standards under section 112(d)(2) and concluded that there is no MACT floor and the BTF technology was not cost effective. The rulemaking was conducted pursuant to section 112 and was not (and could not be) developed under section 129.

5. One commenter (IV-D-20) stated that the analytical accuracy and lower detection limits for Method 29 for mercury may not be accurate enough to detect compliance with a 10 μg/dscm standard or even a 20 μg/dscm. This was presented at December 1997 ASME committee meeting and later confirmed by EPA at a February 1998 ASME committee meeting.

Response: The EPA acknowledges this comment and notes that because there is no mercury emission limit for NHW cement kilns, comments about Method 29 are not applicable.

6. Two commenters (IV-D-24 and IV-D-25) stated that EPA was not consistent in requiring activated carbon injection as a BTF control for HW kilns and not requiring it for NHW kilns.

Response: The EPA reconsidered the use of carbon injection for control of D/F and mercury emissions from HW kilns and decided not to base a mercury standard on carbon injection as a BTF control for HW kilns since it is not cost effective. Thus,

the final rules for HW and NHW kilns are consistent and will not require the use of activated carbon injection as a BTF technology.

7. Eleven commenters (IV-D-20, IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA correctly concluded that a MACT standard for mercury emissions is not justified due to two key factors. First, NHW cement kilns contribute less than 3 percent to the total U.S. emissions of mercury. Secondly, with no technology presently used to control mercury emissions at cement plants, the mercury standard would be a BTF standard based on activated carbon injection.

Response: The EPA acknowledges the support for not imposing a mercury emission limit on NHW kilns based on BTF technology.

8. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) believe that EPA failed to include many industrial source categories that would logically be emitters of mercury and other section 112(c)(6) pollutants (e.g., steel mill blast furnaces, electric arc furnaces, and coke ovens) from its section 112(c)(6) inventory of sources of those emissions. Thus, in reality, the cement industry emissions represent an even smaller percentage of the national emissions than indicated by EPA's current estimate (that cement kilns account for less than 3 percent of the mercury inventory).

Response: The EPA considered and included all available information on the emissions of mercury and other 112(c)(6) pollutants in its analysis. Moreover, in compiling the draft emission inventory for section 112(c)(6) listing purposes, the Agency posted a draft inventory on its Unified Air Toxics Web

Site in 1997, soliciting comments and additional information on sources and their emissions. The revised inventory which provided the basis for EPA's listing actions considered all information received, and incorporated all that could be documented and/or verified. See also comment/response 2.3.4.

9. One commenter (IV-D-27) requested that EPA clarify in detail its position for not including an emission limit for mercury. Mercury is a persistent and bioaccumulative pollutant that warrants regulation under section 112(d) as provided in section 112(c)(6). Specific questions that should be addressed are listed below.
    a. To what extent did EPA investigate controls for similar sources that may be transferrable to portland cement manufacturing?
    b. Has EPA done any inlet/outlet testing to ascertain whether pollution control devices reduce mercury emissions in the industry? Has EPA investigated using special fabrics in baghouses to control mercury?

Response: The EPA determined, at proposal, that the MACT floor for both new and existing sources was no control. The EPA evaluated activated carbon injection as a beyond the floor alternative for control of mercury emission from NHW kilns and in-line kiln/raw mills, and this technology was not found to be cost effective.

Feed and/or fossil-fuel switching or cleaning has not been undertaken by any NHW kilns in order to reduce mercury emissions, and therefore these are not MACT floor options. For this reason feed and/or fossil-fuel switching or cleaning would be considered a beyond the MACT floor option but the EPA does not have data, nor did commenters provide data, that show that this option would

consistently decrease mercury emissions.

The proposed rule for Hazardous Waste Combustors included a standard for mercury. However, control of mercury in that rule was based on controlling the amount of mercury in the hazardous waste fuel, not controlling raw material or fossil fuel. This approach is thus not available to NHW kilns.

In addition, based on the Electric Utility Report to Congress on HAP emissions, EPA believes that fuel switching among different coals and from coal to oil would not consistently reduce HAP metal emissions from cement manufacturing plants. (Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units - Final Report to Congress, volume 1, 453/R-98-004a, February 1998, pp. 13-1 through 13-5.) Therefore, the final rule establishes MACT for mercury as no control.

Since mercury is volatile and not well controlled by PM control devices (p. 13-27, Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units -- Final Report to Congress, volume I, 453/R-98-004a, February 1998), the EPA also considered activated carbon injection as a BTF mercury control, that has been demonstrated in other industries, and concluded that such control was not cost effective for NHW kilns (docket item II-B-67 and II-B-77).

The effectiveness of carbon injection in controlling mercury emissions was tested by EPA/OSW at a Lafarge Fredonia HW wet kiln (docket item II-A-45). Mercury concentrations were measured in a slip stream downstream from the ESP. (Inlet ESP temperatures were not reported. However, the maximum inlet temperature is permitted at 425 ^{o}F.) Mercury emissions were measured during four baseline runs without carbon injection and during four runs with approximately 300 mg/dscm of carbon injected upstream of the existing ESP. Mercury emissions were 78 percent to 93 percent (averaged to 86 percent) lower when the carbon was injected. The average mercury removal percentage is comparable with those

achieved in MWCs with carbon injection (docket item II-B-66).

As noted in the Report to Congress on HAP emissions from electric utilities (http://www.epa.gov/ttncaaal/t3rc.html), the effectiveness of carbon injection in removing mercury depends on mercury speciation (i. e., carbon injection does not effectively remove elemental mercury), and mercury speciation appears to depend on the type of coal burned. The EPA has no inlet/outlet mercury concentration data from NHW kilns and has not conducted emissions tests for mercury removal at cement facilities using fabric filters with special fabrics. However, EPA will be performing research and development work with the objective of finding more cost effective methods to reduce mercury air emissions from fossil-fuel fired electric utilities, and EPA will in the future consider whether any more cost effective methods may be appropriate as a basis for reducing mercury emissions from NHW cement kilns.

10. One commenter (IV-D-28) stated that since cement kilns are not insignificant sources of mercury, depending on the fuel they use, EPA should consider establishing mercury emission limits.

Response: The EPA did consider mercury emission limits, has determined that the MACT floor for new and existing kilns is no control, the BTF options are not cost effective, and has therefore not proposed standards.

11. One commenter (IV-D-35) stated that OSW would conclude that mercury emissions from HW cement kilns should not be regulated if they had conducted a proper MACT determination.

Response: Comments on the HW cement kiln rule have been referred to EPA/OSW. The HW kilns are regulated under a separate rulemaking. The HW kiln operation can include the use of a wide range of hazardous waste fuel compositions. Further, HW kiln

owners and operators are able to control the amount of mercury inputted to the kiln via the HW for control of mercury emissions. Within the NHW kiln population the MACT floor was determined to be no control and BTF standards were not found to be cost effective.

5.5.2 Comment: Comments on mercury emission controls are noted below.

1. One commenter (IV-D-16) stated that EPA should make the mercury emission floor control be mercury feed limits or a specified fuel source, such as natural gas. The current boilers and industrial furnaces rule has mercury limits for the total feedstream (including raw material, coal, and other fuels used in the kiln). The industry-supplied test data indicate that there is a significant difference in mercury emissions where coal is the fuel source for the kiln. The median mercury emission for coal-burning kilns was 28.7 μg/dscm as compared to 5.8 μg/dscm for natural gas burning kilns. The fuel employed in the cement kilns has a significant effect on emissions and EPA can set a floor based on total mercury in the feed, fuel, or both. Thus, EPA's proposal did not take into account appropriate floor and beyond-the-floor mercury emission control strategies, and is otherwise inconsistent with other Agency rulemaking.
2. One commenter (IV-G-1) believes that it is appropriate for EPA to establish a BTF standard for mercury emissions. One option for a BTF standard would require these manufacturers to control the feedrate of mercury in order to not exceed a theoretical mercury emission concentration. The EPA previously proposed such a mercury emission limit for HWC (61 FR 17384).

A second option is for the EPA to require these manufacturers to clean the feed material. The electric utility industry is using similar technology to clean coal in order to reduce the emissions of HAPs from electric utility power plants.

Response to issues 1 and 2: The EPA has determined that the MACT floor for new and existing kilns is no control, the BTF controls are not cost effective, and therefore the EPA has not established standards. Feed and fossil-fuel switching or cleaning have not been undertaken by NHW kilns to reduce mercury emissions, and therefore these are not MACT floor options. For this reason feed and/or fossil-fuel switching or cleaning would be considered a beyond the MACT floor option but the EPA does not have data, nor did commenters provide data, that show that this option would consistently decrease mercury emissions. Moreover, as noted earlier, raw material feed control is prohibitively costly for this industry. The Boiler and Industrial Furnaces rule is based on the ability to control the amount of mercury in the hazardous waste fuel, not in raw materials. This approach is not available to NHW cement kilns.

Based on the Report to Congress on HAP emissions from electric utilities, EPA believes that fuel switching among different coals and from coal to oil would not consistently reduce HAP metal emissions from cement manufacturing plants. (Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units - Final Report to Congress, volume 1, 453/R-98-004a, February 1998, pp. 13-1 through 13-5.) Therefore, the final rule establishes the MACT floor for mercury as no control.

3. One commenter (IV-D-20) noted that in docket item II-B-65 EPA stated that there is "no apparent relation between mercury emission levels and stack gas

temperature" or no simple mercury control technique.

Response: The EPA acknowledges this comment that there is no apparent relation between mercury emission levels and stack gas temperature or no simple mercury control technique.

4. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated if EPA chose to go BTF to control mercury emissions, it would represent regulation for regulation's sake and control for control's sake, whatever incidental reductions might be achieved.

Response: The EPA did not chose to require beyond the floor control of mercury.

5. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA correctly concluded that the use of activated carbon injection (ACI) as a BTF control technology is not justified. The following problems are associated with ACI. These problems apply equally to the potential extension of ACI to new or reconstructed kilns for purposes of controlling mercury emissions.
   a. It is costly.
   b. Temperature control is expected to be effective in controlling cement plant mercury emissions.
   c. It has not been demonstrated to effectively control potential mercury emissions from cement kilns.
   d. The CKD containing carbon used to collect mercury could not be recycled to the manufacturing process, since mercury and mercury compounds are not destroyed when combusted. All CKD would have

to be land disposed and thereby waste mineral resources and increase cement industry fuel usage and emissions of greenhouse gases and criteria pollutants.

Response: The EPA investigated the use of activated carbon injection as a BTF technology for controlling mercury from NHW kilns and found that it was not cost effective. Therefore, there is no mercury limit and EPA is not basing a standard on the performance of ACI.

6. One commenter (IV-D-35) pointed out that activated carbon injection or other carbon technologies (including carbon bed) are in direct conflict with EPA's Waste Minimization National Plan to promote multimedia environmental benefits and prevent cross-media transfers. If activated carbon injection (or other related technologies) were used as a beyond-the-floor control, mercury and/or dioxins would be transferred from the air to the activated carbon (a cross media transfer) but would generate potentially large quantities of hazardous waste which would have to be properly managed at a significant cost. The commenter believes there would be more risk to human health and the environment with a carbon technology.

Response: A BTF standard based on carbon injection was not found to be cost effective, however the EPA does not necessarily agree with the commenters rationale.

5.5.3 Comment: Comments on the mercury emissions data are listed below.

1. Commenter (IV-D-20) stated that while there may be more recent data that could have been used to expand the mercury emission data base for NHW cement kilns, this newer data is not expected to have materially changed

EPA's conclusions regarding the need to control mercury emissions.

2. One commenter (IV-D-20) stated that the amount of mercury emissions data in docket item II-B-65 for NHW cement kilns is small in proportion to the number of kilns.

3. The EPA corrected mercury emissions data for HW kilns to factor out mercury that was in the hazardous waste fuel or spiked during Boilers and Industrial Furnace (BIF) testing. One commenter (IV-D-20) stated that EPA does not provide sufficient data in docket item II-B-65 to confirm the calculations for correcting HW kiln mercury emissions data. However, Gossman Consulting, Incorporated confirmed both the emission rate and percentage of mercury from traditional sources for two kilns for which they conducted 1992 BIF tests.

4. One commenter (IV-D-20) stated that the corrected HW mercury emissions data are reliable, given EPA's method of correcting the data, but may overstate emissions given that the HW data were obtained during Certificate of Compliance (COC) testing (in which kilns are operated with maximum fuel and raw feed input rates and frequently with detuned PMCDs). The COC testing conditions may account for the difference in average NHW cement kiln mercury emission rates (reported in docket item II-B-57) "without the corrected HW data" (17 μg/dscm) and "with the corrected HW data" (24 μg/dscm). Correction of the HW mercury emissions data actually works to the advantage of NHW cement kilns by raising the average emission rate from 17 μg/dscm to 24 μg/dscm.

5. One commenter (IV-D-20) noted that docket item II-B-65 also states that all of the NHW data were well below 60

μg/dscm.

Response: The EPA analyzed the available data, and concluded that the MACT floor was no control and that a beyond the floor standard would not be cost effective. The EPA acknowledges the comments about the mercury data and its analyses.

5.5.4 Comment: Seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) stated that the discussion (63 FR 14202) in the proposed rule only cites the original HWC proposal, failing to recognize the evolution of updated database and generation of significant industry comments. (The commenter provided CKRC comments regarding errors in the HWC emissions database as Exhibit 13. The commenter stated that HWC combustion BTF decisions were based on erroneous emissions data.) Therefore, any discussion justifying a mercury standard for cement kilns burning HW based on the Agency's original HWC MACT analysis is inaccurate and inappropriate.

Response: The discussion was written to contrast the proposed mercury emission regulations for NHW and HW kilns, and not to justify the original HWC proposal. The proposed HWC rule applies to a different class of cement kilns. The BTF mercury standards were not found to be cost effective for NHW kilns. The commenters provided no new NHW kiln data.

5.5.5 Comment: Seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) noted that this proposal (63 FR 14202) attempts to rationalize the inappropriate establishment of the mercury standard in the proposed HWC MACT rule by stating that, on a heat input basis, HW fuels contain more mercury than coal. The commenter stated that such an unsupported blanket statement should not be made as it fails to recognize that there are other sources of mercury such as fossil fuels and raw materials. Mercury emissions at individual cement kilns are overwhelmingly the result of site-specific factors

including the raw materials and the type of cement manufacturing process used. The EPA is obviously basing its conclusion on the incorrect mercury national emission estimates for HW cement kilns given in the flawed April 19, 1996 proposal for HWCs.

Response: The Agency's conclusion in the March 24, 1998, proposal (63 FR 14202) that HW CKs generally emit higher mercury emissions than NHW CKs was not based on the national emissions estimates analysis presented in the April 19, 1996 HWC proposal. Instead, the Agency conducted an analysis of site-specific data and information of mercury emissions (in addition to other metals and chlorine) from HW CKs to evaluate the potential difference in emissions when firing HW versus coal.

The Agency concluded that there were insufficient data on stack emissions generated from a particular source when burning HW compared to when the source was burning only fossil fuels (i.e., coal only) to conduct a direct comparison of emissions. Therefore, the Agency assumed that for a given CK, the Hg stack emissions were directly related to the Hg content of the feedstreams (i.e., an increase in the Hg feed concentration leads to a direct increase in stack gas emissions levels). By conducting the analysis on a site-specific basis, the impacts due to factors such as varying concentrations of mercury in raw materials, manufacturing process differences, and different types of control equipment were minimized.

The Agency's analysis compared the mercury content in coal and in hazardous waste fuel burned in lieu of coal on a per BTU basis. In general, the HW contains greater concentrations of mercury than coal. Specifically, only 2 of 18 sites had higher Hg concentrations in coal than HW. In addition, the Agency evaluated on a percentile basis the concentrations of Hg in coal and HW grouped from all HW CKs. The results show that in none of the selected percentiles (i.e., 25th, 50th, 75th, 90th, 95th,

99th) was the coal concentration higher than the HW concentration. Thus, a CK feeding a HW fuel will emit more Hg than when burning coal with a given raw material. Additional discussion of this analysis can be found in “Final Technical Support Document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies,@ dated February 1999.

5.6 Selection of Emission Limits: HCl

5.6.1 Comment: Comments on the HCl emission limit are given below.

1. One commenter (IV-D-16) stated that since EPA had not provided HCl emissions information in the March 24, 1998 proposed rulemaking and had not referenced any document that contained HCl emissions, the commenter could not calculate the statutory floor for HCl emissions. The EPA must use the emissions data it has to set standards that comply with section 112(d). If EPA does not have such information, it must use its section 114 authority to obtain the data.
2. Two commenters (IV-D-27 and IV-D-28) believe that EPA should require a limit on emissions of hydrogen chloride due to the following reasons.
    a. The EPA did not provide data to show that hydrogen chloride emissions pose no threat to public health.
    b. According to one commenter (IV-D-27), large quantities of hydrogen chloride are emitted from new and existing NHW kilns and in-line kiln/raw mills.
    c. According to one commenter (IV-D-27), the issue, of whether hydrogen chloride emissions from cement kilns pose no danger to public health or the environment, is not a relevant issue in the MACT

standard setting process. The commenter believes that the purpose of the MACT standards is to reduce the national inventory of HAP emissions. The impacts to public health following implementation of MACT standards will be studied under section 112(f).

3. One commenter (IV-D-28) stated that it is possible that cement plants exceed ambient guidelines for HCl.

Response to issues 1, 2, and 3: HCl emissions data and test reports are included in the rulemaking docket. (See item II-B-62 for a summary of emissions data with test report references).

With regard to the comments about the threat to public health or the exceedence of ambient guidelines, the EPA is conducting this rulemaking under section 112(d)(2) and therefore the decision on an emission standard is not based on health risk, ambient guidelines, or emission levels. Impacts to public health will be studied and addressed later under section 112(f) of the Act. With regard to the use of section 114 authority, see response to comment 5.2.5.3.

The EPA determined, at proposal, that the MACT floor for both new and existing sources was no control. Further, no cost effective beyond the floor alternatives were identified. The commenters provided no new information on the use of any control technologies to limit emissions of HCl from NHW kilns. For this reason no emission standard is being established for HCl.

4. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6,) stated that EPA appropriately concluded that there is no basis for including a MACT standard for hydrogen chloride. Two commenters (IV-D-23 and IV-D-24) offered the following points in support.

a. There is no MACT floor for cement plants.

b. A BTF standard is not cost-effective.

c. A BTF standard would not provide human health and environmental benefits.

Response: The EPA acknowledges the comments, but does not agree that there would be no human health or environmental benefits to a BTF standard.

5. Two commenters (IV-D-24 and IV-D-25) noted that, unlike EPA/OSW, EPA/OAQPS did not consider any form of feed-rate controls as either a floor or BTF technology, even though NHW kilns can add chlorine as raw material. In commenting on the HWC rule, the commenter stated that control of the feedrate of HCl and metals is not an existing control technology but is one of many parameters that HW kilns are required to monitor to ensure compliance with the BIF rule. Thus, EPA was inconsistent in developing emission standards for NHW and HW kilns.

Response: The commenter provided no data on the addition of chlorine as a raw material in NHW cement kilns. Comments on the HW cement rule have been referred to EPA/OSW. The EPA is unaware of any NHW kiln sources that have added chlorine as a feed material, nor practiced feed-rate control of chlorine to reduce HCl emissions, therefore this is not a MACT floor option to consider. The difference in chlorine monitoring requirements between the two proposed rules is reasonable because HW kilns are currently subject to the BIF rule requirements, which establish a floor level of control, whereas NHW kilns are not.

6. One commenter (IV-D-25) stated that EPA's rationale for not establishing a hydrogen chloride standard for NHW cement kilns applies equally to HW kilns.

Response: Comments on the HWC rule have been referred to

EPA/OSW. HW kilns may use hazardous waste fuels containing potentially large amounts of chlorine. Emissions of HCl from HW kilns may be controlled by limiting the amount of chlorine in the hazardous waste fuels.

5.6.2 Comment: Comments on the HCl emissions data follow.

1. One commenter (IV-D-20) stated that although the proposed NESHAP does not limit HCl emissions, the FTIR measured data and the average 50 ppm emission rate "was based on data contained in two test reports."

Response: The average measured HCl level in cement kilns exhaust, based on available test reports, was 27 ppmvd (Docket item II-B-62), however the vast majority of these data were determined by method 26. The EPA believes that Method 26 may understate, in many cases, the actual HCl level of portland cement kiln exhaust gases.

2. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that EPA has overestimated cement kiln HCl emission rates. In Attachment E[17] to docket item IV-D-26, the commenters state that the mean HCl emission value was 9.6 ppmvd at seven percent oxygen[18] while EPA reported the average as 27 to 35 ppmvd. The commenters' data were obtained by Method 26, 26A, GFCIR, and FTIR, while the EPA data were obtained primarily by FTIR and GFCIR. Apparently EPA believes that a low bias in EPA Reference Method 26 and 26A is

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[17] Supplemental Comments of American Portland Cement Alliance on the Proposed Portland Cement NESHAP, prepared Air Control Techniques, P.C., June 26, 1998.

[18] Compilation of Cement Industry Air Emissions Data for 1989 to 1996, prepared by Air Control Techniques, P.C., September 1996, Attachment B to docket item IV-D-26.

responsible for the low HCl emissions reported in many of the tests summarized by the Portland Cement Association. This conclusion is premature.

Response: Realizing the potential for either positive or negative bias in method 26 results, EPA chose results from infrared spectroscopy methods (FTIR) to better represent hydrogen chloride emissions. Further discussion of test methods is included in chapter 8 of this document.

6. MONITORING

6.1 Monitoring: General

6.1.1 Comment: One commenter (IV-D-35) supports EPA's proposed performance test frequency of once every five years because:

1. it coincides with Title V operating permitting
2. conducting performance tests more frequently as required in the proposed HWC rule can be costly and without benefit
3. monitoring opacity (as a surrogate for metals) and temperature at the inlet to the APCD (as a surrogate for dioxin/furans) are adequate for evaluating ongoing compliance.

Response: The EPA acknowledges support for the proposed performance test frequency. However, in response to comments on keeping the rules for HW and NHW cement kilns consistent, the final rule requires D/F performance testing every 30 months. The PM performance test frequency remains at once every 5 years.

6.2 Monitoring: PM/HAP Metals

6.2.1 Comment: Comments on opacity monitoring follow.

1. According to one commenter (IV-D-13), the initial compliance determination for opacity is made with a 6-minute average, while according to paragraph 63.1349(a) and (b), compliance is demonstrated with a 30 minute average. This commenter suggested that the averaging time for initial and subsequent compliance determinations be either 6 minutes or 30 minutes.

   One commenter (IV-G-5) recommends that sections

63.1343(b)(1) and (c)(2) specify that the 20 percent opacity limit is a 30-minute average and that section 63.1348(b)(1)(v) should be changed to the highest 30-minute average during the Method 5 performance. The EPA should make the sections consistent.

Response: The final rule has been clarified. Initial and subsequent continual compliance with the 20 percent kiln opacity limit is demonstrated by means of averaging opacity readings over a 6-minute block period. This is consistent with the requirements of the NSPS for portland cement, which was determined to be the basis for the MACT floor for PM/metals.

2. As one commenter (IV-D-13) noted, plants that cannot install a COM must determine the average opacity visually for only one 30 minute interval per day, whereas a plant that has a COM cannot chose when to monitor opacity. As written, the proposed rule allows plants that conduct visual opacity monitoring the choice of when and under what operating conditions to perform the test. This is not fair to plants that are required to use a COM. The EPA should specify that the process must be under the expected maximum operating rate and conditions for the day and might state that the observations be at the same hour each day or no later than one hour after startup for that day.

Response: In accordance with the general provisions, the daily Method 9 test must be done under the maximum-operating conditions reasonably expected to occur for the day (with periods of startup, shutdown and malfunction excepted). The final rule has been clarified.

3. One commenter (IV-D-16) stated that the proposed opacity monitoring requirement violates sections 114 and 503 because EPA has not established a correlation

between the proposed PM standard and required opacity levels. Meeting the opacity limit does not ensure that the PM emission standard will not be exceeded.

Response: The kiln, in-line kiln/raw mill, and clinker cooler opacity limits are separately enforceable requirements, and are not intended to be correlated with a certain PM level. However, opacity exceedances will indicate that the affected source is not in compliance with the MACT floor level of particulate HAP control.

4. One commenter (IV-D-18) stated that monitoring of process and/or control equipment parameters is an "easier, less costly" monitoring approach than opacity monitoring. Maintaining the status quo is also easier and less costly, as well as more responsible.

Response: Given the prevalent use of continuous opacity monitors (COMs), they could be considered the status quo, and the Agency considers these monitors the preferred means for demonstrating compliance within this source category. Opacity monitors are useful for detecting major malfunctions of the APCD, and opacity exceedances are directly enforceable violations of the standard and will indicate that the affected source is not in compliance with the MACT floor level of particulate HAP control. The Agency acknowledges that the monitoring of APCD operating parameters may be less costly than opacity, but the commenter did not specify which parameters to monitor in lieu of opacity, and provided no data.

5. One commenter (IV-D-18) stated that EPA's rulemaking indicates that the median emission rate for each non-volatile HAP metal from cement kilns is less than 0.019 tons/year - i.e., less than 38 pounds/year (per docket item II-B-46, attachment 2, pg. 1). These are *de minimis* values - especially when measured against the

ability of COMs to quantify mass emissions (± thirty percent). Thus, even when COMs are operating properly, the variability in measured vs. actual emissions from COMs will mask the HAP metal content in the PM that was used to justify imposing the monitoring obligation in the first place.

Response: Section 112 of the Act does not provide for exceptions from emission standards based on *de minimis* principles where a MACT floor exists. The rule has been changed to reflect that opacity is a separately enforceable emission limit. Opacity can be continuously measured with COMs and is an indicator of the need for PMCD maintenance. Thus, COMs are used to ensure that the MACT floor level of particulate HAP and metal HAP control is maintained. See also the response to comments 5.1.3, 5.1.5, 5.2.4, 5.2.6, and 5.2.7 regarding the use of PM as a surrogate for HAP metals.

6. With regard to monitoring opacity with COMs, one commenter (IV-D-16) noted that EPA has failed to consider or explain: (a) how averages are to be calculated when zero/span control cycles occur during the thirty-minute averaging period,
(b) how monitor downtime for routine preventive maintenance, quality assurance, and COM corrective action is to be addressed in computing the thirty-minute values, (c) what is to be done in the event that there is a data acquisition system breakdown or COM downtime during a six-month reporting period, and
(d) what other procedures are applicable for missing data?

Response: The general provisions, section 63.8(c)(4) provide that except for system breakdowns, out-of-control periods, repairs, maintenance periods, calibration checks, and

zero (low-level) and high level calibration drift adjustments, the COM shall be in continuous operation. The final rule requires each facility's operating and maintenance (O&M) plan to address data reduction for periods interrupted by maintenance and calibration operations. Further, the rule has been revised to clarify that the averaging period for COM data is 6 minutes.

7. According to one commenter (IV-D-18), the proposed rule requires COMs to meet 40 CFR 60, Appendix B, Performance Specification 1 (PS-1). This specification is out-of-date and was never developed for monitoring compliance with numerical emission limits. In 1994, EPA proposed to address some of the deficiencies with PS-1 but never promulgated the revisions. The EPA must revise PS-1 before requiring compliance with it and certainly before using data from COMs for purposes other than as a relative indicator of process and control equipment performance.

Response: The opacity limit is a separately enforceable limit to ensure continuous compliance with the MACT floor level of particulate HAP control. COMs must be installed in accordance with PS-1 as promulgated in appendix B to 40 CFR 60. Operators may request approval of alternate monitoring procedures, if necessary in accordance with the general provisions section 63.8(f). Currently, PS-1 is going through revisions. In 1994, proposed revisions were published in the Federal Register. A supplemental proposal to the 1994 proposal was published in the Federal Register on September 23, 1998. This supplement proposes to incorporate by reference a standard practice developed by ASTM. There was a two-month period for all interested parties to provide comments on this proposal. Promulgation is expected by mid-1999.

8. One commenter (IV-D-18) stated that EPA must develop

quality assurance procedures for COMs and include them in Appendix F of 40 CFR 60.

Response: The General Provisions include quality assurance requirements for COMs in section 63.8(d).

9. One commenter (IV-D-18) stated that most sources cannot meet a 15 percent opacity level during startup. Although part 63 standards provide that sources must prepare startup, shutdown, and maintenance plans, EPA should expressly state in the cement NESHAP that compliance with the opacity limit is not required during startup.

Response: The General Provisions state that the standards do not apply to periods of startup, shutdown and malfunction. Site-specific startup, shutdown and malfunction plans are required under section 63.6(e)(3). Further, the proposed 15 percent opacity limit has been removed from the final rule.

10. One commenter (IV-D-18) stated that EPA has offered no explanation for the selection of a thirty-minute averaging period for cement kiln opacity monitoring compliance determinations. The use of "any thirty-minute period" implies that this is a rolling average based on the most recent five six-minute averages. This is an unnecessarily complex and burdensome data processing requirement.

Response: The final rule has been clarified to indicate that compliance must be demonstrated for each and every 6-minute block period, based on an arithmetic average of all readings within the 6-minute period.

11. One commenter (IV-D-35) stated that the wording "any 30-minute period" in section 63.1349(3) is not consistent with the General MACT provision. Excess emissions of opacity greater than 30 minutes in

duration during startup, shutdown, and malfunction would not be a violation because the standard is not applicable at that time. Thus, the following statement is not correct.

> "If the average of the six-minute average opacities for ANY 30-minute period exceeds 20 percent, this shall constitute a violation of the standard."

The statement needs to be revised to exclude periods of excess emissions of a 30-minute duration during startup, shutdown, and malfunctions.

Response: The General Provisions clearly state that the standards do not apply to periods of startup, shutdown and malfunction. Site-specific startup, shutdown and malfunction plans are required under section 63.6(e)(3). Further, the rule has been revised to clarify that the averaging period for COM data is 6 minutes.

12. One commenter (IV-D-23) requested that EPA define the scope of raw mill and finish mill monitoring requirements to include only the major air pollution control devices. Specifically, the monitoring should be limited to the mill sweep and air separator APCDs associated with raw and finish mills (which usually represent over 95 percent of aggregate PM emissions from the mill systems).

Response: The final rule has been clarified to limit raw and finish mill monitoring to the mill sweep and air separator APCDs.

13. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) support the proposed opacity method and believe it will ensure continuous compliance with the proposed opacity

standard.

Response: The EPA acknowledges support for the proposed opacity limit but notes that the opacity monitoring requirements for raw mills, finish mills, and materials handling facilities have been changed in the final rule.

The final rule requires the owner or operator to monitor the opacity from raw mills and finish mills by conducting a daily six-minute test in accordance with Method 22, "Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Flares." Owners or operators of raw mills and finish mills are required to initiate corrective action within one hour of a Method 22 test during which visible emissions (VE) are observed. A 30-minute Method 9 opacity test must be started within 24 hours of observing VE.

Visible emissions from materials handling sources and raw material dryers shall be monitored with Method 22 once per month. This requirement shall be part of the site’s operation and maintenance plan. After 6 months without VE for each individual source, the monitoring frequency is reduced to a semi-annual basis. If there are no VE in the next 6-month period for a particular source, the monitoring frequency is reduced to an annual basis. If VE occur during the annual inspection, the frequency would revert back to once per month. A 6-minute Method 9 opacity test must be started within one hour of observing visible emissions.

14. One commenter (IV-D-28) stated that although it is clear that EPA's intent is to use opacity to determine continuous compliance with the particulate standard, this is not clear in sections 63.1349(a),(b), and (c). The monitoring requirements in these sections specify how a facility shall demonstrate continuous compliance with the opacity standard but there is no mention of

the particulate standard. If EPA intends to use opacity as a means for demonstrating continuous compliance with the particulate standard, then this should be clearly stated in this section.

Response: The opacity limit is a separately enforceable standard which promotes good operation and maintenance and thus continuous compliance with the MACT floor level of particulate HAP control.

15. One commenter (IV-D-28) noted that as one of the options for monitoring opacity, the proposal calls for performing ten consecutive 30 minute Method 9 tests, which would take five hours. Fatigue on the part of the observer would negate any benefits from such an arduous and tedious task.

Response: The proposed rule and the final rule require 5 consecutive 6-minute tests for monitoring.

16. One commenter (IV-D-28) believes that the option to average six minute averages over a 30 minute period relaxes the stringency of the opacity standard to the point where one would almost never see a violation. It seems that EPA has allowed a shorter period for this test in certain situations in the past and the commenter suggests that EPA consider that option in this case.

Response: The final rule has been clarified to indicate the compliance must be demonstrated for each and every 6-minute block period, based on an arithmetic average of all readings within the 6-minute block period. This is consistent with the requirements of the NSPS, which forms the basis for the MACT floor for control of particulate HAP.

17. One commenter (IV-D-28) stated that condensation of stack gases may create a potential discrepancy between

facilities using continuous opacity monitors (that are usually sited where stack gases have not yet condensed) and those relying on Method 9. Facilities relying on Method 9 may be reading opacity at a point after condensation has occurred.

Response: Method 9 states that opacity observations shall be made at the point of greatest opacity in that portion of the plume where condensed water vapor is not present. Method 9 further instructs that in cases of attached or detached steam plumes the readings be made where condensed water vapor is not visible.

18. One commenter (IV-D-35) does not agree with EPA's proposed rule that exceeding the opacity limit for any 30 minute average is a violation of the PM emission limit. A violation of the PM emission limit cannot be established with Method 9 or COMs, as both methods do not measure mass PM. A violation of the PM emission limit must be established by conducting a Method 5 test or the use of other "credible evidence." Mass PM and opacity relationships are of limited value in this industry because of the variability in particle size distribution and should therefore not be used for enforcement purposes. The Medusa Wampum plant has found that high opacity (exceeding 20 percent) is not necessarily associated with high PM emissions (exceeding 0.3 lb/ton dry feed), as a result of detuning the ESP during Certificate of Compliance (COC) tests for BIF compliance with Method 5 testing.
19. One commenter (IV-D-35) stated that EPA's Credible Evidence Revisions, Final Rule (62 FR 8314) provides that where information (such as non-reference emissions data, parametric data, or engineering analyses) is

equivalent to information generated by reference test methods, the former may be used to establish compliance or noncompliance in an enforcement action. Monitoring opacity is not "credible evidence" because it is not equivalent to information generated by the reference test Method 5 and cannot determine compliance with the PM emission limit.

Response to issues 18 and 19: The final rule has been clarified such that the 20 percent kiln and in-line kiln/raw mill opacity requirement is a separately enforceable emission limit. LM 4/12 with Silverman re whether we should state that an opacity exceedence is not necessarily a PM exceedence.

20. One commenter (IV-D-35) stated that the requirement in section 63.1349(4) of the proposed rule is setting up plants for numerous violations for not implementing the operation and maintenance plan within one hour because:

    a. some plants may have difficulties on third shift or weekends in implementing the plan within one hour.

    b. proper documentation may create numerous violations.

    c. One commenter (IV-D-20) stated that one hour does not allow sufficient time for cooling off of particulate matter control device temperatures.

    One commenter (IV-D-35) recommends that EPA extend the time of implementation from one hour to three or four hours. Another commenter (IV-D-20) asked what is the definition of "initiate."

Response: One reason that the rule requires the preparation of a written operations and maintenance plan is to have the owner or operator develop a workable approach for response to third shift and weekend problems within the required time. Initiating

cooling off of PMCDs is part of commencing implementation of corrective action. "Initiate" means to begin the procedure in the O&M plan. The procedures in the plan must then be completed expeditiously. In any event, the 15% kiln and in-line kiln/raw mill opacity trigger for implementing O&M procedures (referred to by the commenters) has been deleted from the final rule.

21. One commenter (IV-D-35) recommends that a violation is extreme for a plant not implementing an operation and maintenance plan within one hour (as stated in section 63.1349(4) of the proposed rule) since the plant opacity is in compliance with an opacity limit of 20 percent (and not 15 percent as listed in section 63.1349(4)). EPA should consider the situations described in section 63.1349(4) as a deviation rather than a violation.

Response: The requirements for kiln and in-line kiln/raw mill corrective action and development and implementation of QIPs have been removed from the final rule. The 20 percent opacity limit is a separately enforceable emission limit which represents and demonstrates continuous compliance with the MACT floor level of particulate HAP control.

22. One commenter (IV-D-35) questions how EPA decided that the average of the 6-minute average opacities for any 30-minute period is a violation, since it is not consistent with the CEMs Enforcement Strategy used by most states or EPA Region IV and is not consistent with the requirement for notification in the event of excess emissions for more than two or four hours in duration that is used by some states. (See the commenter's attachment B for a description of the strategies and attachment C for a list of the states that merely require the notification.) In general, the CEMs

Enforcement plans state that sources that demonstrate that they are below their emission limit 95 percent of the time and have 95 percent monitor availability are presumed to exhibit proper operation and maintenance. Sources below one or both of these target criteria are not in compliance. (The Georgia EPA CEMs Enforcement Strategy has different percent cutoff values.)

Response: Based on comments received, the requirements for kiln and in-line kiln/raw mill corrective action and development and implementation of QIPs have been removed from the final rule. The 20 percent opacity limit is retained and is a separately enforceable emission limit which represents and demonstrates continuous compliance with the MACT floor level of particulate HAP control. Any six-minute exceedence of the 20 percent kiln opacity standard is a violation of the final rule. Similarly, any six-minute exceedence of the 10 percent clinker cooler opacity standard is a violation of the final rule.

23. One commenter (IV-D-35) attached a paper on Portland Cement Opacity Issues - SP123 that concludes the following.

    a. The 7.5 percent error in measuring opacity with Method 9 and COMs must be considered when any violation is determined.

    b. Any attempt to relate mass concentration to specific opacity should be approached with caution since changes in particle size distribution (and other parameters) may affect the relationship. Further, any relation established at one plant should not be applied to all other facilities.

    c. Well-trained observers should conduct the Method 9 testing.

Response: The errors inherent in the method were considered

when the NSPS was developed, and an achievable standard was developed based on data which included these errors. The NSPS has been enforced for approximately 20 years. The 20 percent opacity limit is a separately enforceable emission limit which represents and demonstrates continuous compliance with the MACT floor level of particulate HAP control. Any six-minute exceedence of the 20 percent kiln opacity standard is a violation of the final rule. Similarly, any six-minute exceedence of the 10 percent opacity standard for clinker coolers, raw and finish mills, raw material dryers, and materials handling facilities is a violation of the final rule. Method 9 requires that the observer be certified and allows 7.5 percent error.

24. One commenter (IV-G-5) suggested that the numeric limit of ten percent for other sources in section 63.1346 of the proposed rule also needs to include a parenthetical reference to the averaging time over which it applies. Since the compliance method and standards development were both Method 9, the appropriate averaging time is at least six minutes.

Response: The final rule has been clarified to indicate the compliance must be demonstrated for each and every 6-minute period, based on an arithmetic average of all readings within the 6-minute block period.

25. One commenter (IV-G-6) incorporates by reference NBHC's previous communications with Joe Wood, EPA:ESD (docket items II-D-201 and II-D-207) which suggested that instead of requiring PM CEMs, EPA should adopt the same PM monitoring and compliance requirements as it adopted in the MWC MACT rule. That rule required the installation of COMs for PM but did not make the data generated directly enforceable because the PM limit was based on Method 5 stack tests. The COM data were used

to initiate corrective actions under appropriate circumstances. This approach ensures that control device performance is monitored and optimized on a daily basis through COM data. Compliance with the PM standard is demonstrated with periodic stack testing.

Response: Similar to the MWC rule which the commenter references, the PM limit for cement kilns is also based on method 5 tests, and compliance is demonstrated with method 5 tests. An opacity limit was established to ensure effective PM control, but opacity is a separately enforced pollutant via continuous monitoring with a COM (where feasible). The opacity limit was established based on, and to maintain consistency with, the NSPS. In order to avoid exceedences of the opacity limit when a source's opacity levels near the 20 percent limit, sources should take corrective action on their own to optimize performance of the PM control device. The proposal required initiation of a O and M plan if 15 percent opacity was reached, but this requirement has been dropped.

6.2.2 Comment: Comments on PM CEMs follow.

1. One commenter (IV-D-18) stated that EPA's justifications for the potential use of PM CEMs are deficient. The justifications include that PM CEMs are used in Europe and have been proposed for use at hazardous waste combustors (including cement kilns that burn hazardous waste) by EPA's Office of Solid Waste.
2. Industry is concerned about EPA's efforts to require the use of PM CEMs for compliance purposes prior to a successful demonstration for the following reasons.
   a. Eight commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) stated that the application of PM CEMs to cement kilns must be thoroughly demonstrated in the specific

and unique conditions found in cement kiln stacks. Commenter (IV-D-22) noted that industry's use of emission monitoring systems as compliance tools came after decades of research and experience.

b. Seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) stated that EPA's single demonstration at a HW incinerator with very low particulate emissions does not adequately demonstrate that PM CEMs can be used for compliance on cement kilns (that have high PM emissions).

c. According to commenter (IV-G-4), the unique physical, operational, and particulate characteristic differences between cement kilns and incinerators make it technically inappropriate to attempt to transfer a HW incinerator CEMs demonstration to cement kilns. These differences include stack diameter, stack temperature, and stack gas chemistry, all of which are likely to directly impact the performance of PM CEMs at a particular facility.

d. One commenter (IV-D-35) stated that a PM CEM demonstration should be conducted for at least one year (to evaluate possible seasonal variations) at a NHW cement kiln (i.e., a preheater/precalciner kiln) in order to properly evaluate PM CEMs.

e. According to commenter (IV-G-4), the methods, specifications, and procedures for the implementation of PM CEMs for compliance purposes must not be technically and/or legally flawed and must have been demonstrated to be achievable on cement kilns.

3. One commenter (IV-G-4) urges EPA to conduct the legally

required technical support work that must be completed before requiring the use of PM CEMs for compliance purposes. It is apparent that EPA is bypassing this critical step only because it wishes to require PM CEMs as soon as possible, despite the absence of any statutory or regulatory requirement to install PM CEMs.

4. One commenter (IV-G-4) is concerned that EPA has crafted the proposed method 5i, procedure 2, and specification 11 to fit the single incinerator test during its test demonstration, without consideration for the different characteristics of cement kilns.

5. In Exhibits 8 and 9 of docket item IV-D-29, the commenters expressed concerns regarding the use of PM CEMs at HW cement kilns that also apply to NWH cement kilns.Until EPA has adequately addressed these concerns, any required use of PM CEMs on cement kilns for compliance purposes would be technically flawed and legally unsupportable. Concerns that have not been previously mentioned include the following.

   a. The EPA has not collected the data needed to set a national PM CEMs-based emission standard.

   b. EPA's Dupont incinerator test does not prove that PM CEMs have been demonstrated to meet the performance specifications (PS-11) and therefore cannot be deemed sufficiently reliable or commercially available for compliance purposes.

6. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) incorporated by reference the APCA comments on the proposed requirement that HW burning cement kilns use PM CEMs to demonstrate compliance with the proposed PM standard. (These comments were provided as attachment D to docket item IV-D-26). The commenters oppose the

use of PM CEMs as proposed in the NODA for the proposed HWC rule for the following reason: The results of the test demonstration conducted at a small hazardous waste incinerator have no bearing on the efficacy of PM CEMs on cement kilns. The two classes of facilities have distinct characteristics. The EPA should analyze the test results for cement kilns before requiring PM CEMs.

7. One commenter (IV-G-3) urges EPA to refrain from requiring PM CEM devices until they are appropriately evaluated with respect to their long-term performance in a cement plant environment. If these units are found to be technically sound, EPA must reevaluate the PM standard taking into account the variability in performance of the control devices that they are monitoring (i.e., ESPs and FFs). To assist EPA in evaluating PM CEMs, Lafarge has offered a volunteer test site and is hopeful that a demonstration program can be conducted in the near future.

Response: In the preamble to the proposal, EPA noted its intent to include a requirement for PM continuous emission monitoring system (CEMS) in the final rule, unless the analysis of existing or newly acquired data and information showed that it is not appropriate (see 63 FR at 14205). Based on successful testing on an incinerator conducted in the interim, as well as extensive use of these monitors in Europe, EPA believes there is sound evidence that PM CEMS should work at cement kilns. In addition, preliminary analyses of the cost of PM CEMS applied to cement kilns (docket items IV-C-1 and IV-C-21) and hazardous waste combustors (HWC) suggest that these costs are reasonable. Accordingly, the final rule contains a requirement to install PM CEMS. However, we agree with comments that indicate a need to

develop cement kiln-specific performance requirements for CEMS and to resolve other outstanding technical issues. These issues include all questions related to implementation of the CEM requirement (i.e. relation to all other testing, monitoring, notification, and recordkeeping), relation of the CEM requirement to the PM emission standard, as well as technical issues involving performance, maintenance and correlation of the CEM itself. These issues may be addressed in a subsequent rulemaking. Therefore, we are deferring the effective date of this requirement for PM CEMs pending further testing and additional rulemaking. As a result, in today's final rule, EPA is requiring that particulate matter continuous emission monitoring systems (PM CEMS) be installed at cement kilns. However, since the Agency has not finalized the performance specifications for the use of these instruments at cement kilns or resolved some of the technical issues noted above, we are deferring the effective date of the requirement to install, correlate, maintain and operate PM CEMS until these actions can be completed. The PM CEMS installation deadline will be established through future rulemaking, along with other pertinent requirements, such as final Performance Specification 11, Appendix F Procedure 2, when the issues are resolved and appropriate data are analyzed. It should finally be noted that EPA has a concurrent rulemaking process underway for hazardous waste combustors (HWC) and plans to adopt the same approach in that rule.

EPA also is taking action now to avoid facilities being in violation of the PM standard during CEM correlation testing. Commenters properly observed that CEM correlation testing would require sources to manipulate their PM control device during correlation tests to obtain higher PM emissions levels than the emission limit. It is necessary to do so because a good PM CEMS correlation must include CEMS and manual method data above the

stated emission standard in order to have a wide enough range of data to meet the correlation coefficiency statistical requirement and to assure that calibrated readings above the level of the emission standard can be properly interpreted. Such data, however, could be misconstrued by state or local enforcement authorities or citizens as violations of the PM standard. It is important to address this issue now to encourage the development of additional PM CEMS data, and not to discourage facilities from choosing to install a CEM before the deferred effective date.

We are addressing this concern here in the same manner we plan to address it in the HWC MACT rule by providing that the particulate matter and opacity standards of parts 60, 61, 63 (i.e., all applicable Parts of Title 40) do not apply during particulate matter CEMS correlation testing, provided that you comply with certain provisions discussed below that ensure that the provision is not abused. EPA is also making this provision effective immediately, so that sources need not wait for the compliance date to take advantage of this particulate matter CEMS correlation test provision. We believe this approach adequately addresses commenters' concerns.

8. One commenter (IV-D-23) opposes the use of PM CEMs for monitoring NESHAP compliance.

9. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) object to the use of PM CEMs at NHW cement plants for direct compliance with the PM standard for the same reasons that they raised in objection to the use of PM CEMs at HW burning cement plants. The commenters included their comments[19] on the use of PM CEMs at HW

[19] Comments of the American Portland Cement Alliance on the Notice of Data Availability and Request for Comments on the Use of Mercury and Particulate Continuous Emissions Monitoring Systems at Hazardous

burning cement plants as attachment D. Their main comments are given in this summary.

10. To support that PM CEMs are not reliable for compliance determinations, seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) provided an analysis of the DuPont PM CEMs data that was prepared by the Coalition for Responsible Waste Incineration as Exhibit 10 (to docket item IV-D-29). Exhibit 10 shows that the five PM CEMs used in the Dupont study do not give comparable readings when sampling the same stack PM concentration. Other findings are listed in Exhibit 10.

11. To support that PM CEMs are not reliable for compliance determinations, seven commenters (IV-D-23, IV-D-24, IV-D-25, IV-D-29, IV-D-35, IV-G-3, and IV-G-4) provided comments from the Chemical Manufacturers Association on the use of PM CEMs for compliance purposes as Exhibit 11 (to docket item IV-D-29).

12. One commenter (IV-D-16) stated that the use of PM CEMs is not only appropriate but essential to the enforceability of any PM emission standard. Therefore, EPA must require them to comply with the Clean Air Act.

13. One commenter (IV-G-4) believes that without a successful long-term demonstration of PM CEM applicability, cement kilns would be inappropriately put in jeopardy of false non-compliance due to instrument problems rather than poor performance of an APCD. Such false evidence of apparent noncompliance could result in improper and significant fines and/or legal actions. The commenter is concerned that the data from inadequately tested CEMs could be used to

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Waste Combustion Facilities dated January 29, 1998.

supplant compliance information generated by widely accepted and utilized test methods under the credible evidence rule. Even if EPA and the state agency recognize flaws in the CEMs data, nothing would prevent a citizen suit under section 304, and cement companies would be forced to litigate, at great expense, the issue of reliability of the CEMs data.

Response: See above response to comments 1-5 of this comment 6.2.3. As discussed in that response, we acknowledge the need to resolve issues related to implementation of the CEM requirement, and the relation of the CEM requirement to the PM emission standard. These issues will be addressed in a subsequent rulemaking when they are resolved. Further testing of PM CEMs on cement kilns will resolve technical issues related to the CEM performance specifications, QA procedures, and manual test methods. Specific issues to be resolved include development of statistical criteria for the acceptance of the PM CEM correlation with PM manual test methods, data availability requirements, and maintenance requirements and guidance. The source's adherence to the performance specifications, QA procedures, and other technical requirements will ensure that the PM CEM data are sufficiently accurate and precise for enforcement purposes. Further, another purpose of the testing is to provide the data necessary to establish an emission limit (and associated averaging time) for which compliance will be demonstrated with a PM CEM, and which is achievable with the use of MACT.

14. One commenter (IV-D-18) stated that if EPA were to require PM CEMs, EPA would need to repropose the cement NESHAP. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that should EPA include a requirement for PM CEMs in the final portland cement NESHAP, the

commenters expect that EPA will first notify the public of its intentions in a supplemental proposal or notice of data availability (NODA), in order for EPA to meet the notice and comment requirements of section 307(d)(3). Section 307(d)(3) requires EPA to publish a notice of proposed rulemaking for certain emission standards, including those adopted under section 112, accompanied by a statement of basis and purpose that includes a summary of the factual data on which the proposal is based, the methodology used in obtaining and in analyzing the data, and the major legal interpretations and policy considerations underlying the proposed rule. Simply including such information in the docket, as EPA indicates it intends to do, would not meet the requirements of section 307(d)(3).

15. One commenter (IV-G-4) stated that if PM CEMs are proven to be reliable in the cement manufacturing industry, EPA should first notify the public through a NODA and then promulgate appropriate CEM-based limits at a later date in a separate rulemaking. If the tests indicate that CEMs are not yet sufficiently reliable or accurate for cement kilns, EPA would not require PM CEMs for compliance purposes.
16. One commenter (IV-G-6) stated that since EPA has proposed to require PM CEMs (unless such monitoring is found to be inappropriate), but has not included PM CEMs in any economic or other SBREFA analysis, it may not proceed to final rulemaking until PM CEMs have been analyzed and that analysis is subjected to public comment through a reproposed rule.

Response: See above response to comments 1-5 of this comment

6.2.3. As discussed in that response, although the final rule contains a requirement to install PM CEMs on cement kilns, we are deferring the effective date of this requirement pending an additional rulemaking. Any future rule will be proposed to take comments on the PM CEMs installation deadline, performance specifications, and other pertinent requirements. Regarding the comment that EPA should revise its SBREFA and economic analysis, see the response to comment 4.2.1, 4.2.13, and 4.3.1.

17. One commenter (IV-D-35) stated that if a concentration based limit is established for PM CEM monitoring, it should be established in such a way so that it does not punish more energy efficient kilns.

18. One commenter (IV-G-6) incorporates by reference NBHC's previous communications with Joe Wood, EPA:ESD (docket items II-D-201 and II-D-207) which opposes the use of PM CEMs because some sources will not be able to precisely monitor "dry kiln feed" on a continuous basis.

19. One commenter (IV-D-35) assumes that the NSPS opacity standards for kilns and in-line kiln/raw mills would be eliminated and the NSPS PM limit would be changed to a concentration basis (of grains per dry standard cubic foot at seven percent oxygen), if the EPA does require PM CEMs. The commenter assumes that the PM and opacity limits for clinker coolers would not change.

Response: In the development of a proposal to establish the deadline for which PM CEMs must be installed and other pertinent requirements, the EPA will consider the possibility of eliminating the kiln opacity limit under the NESHAP, for kilns that are subject to PM CEM requirements. Kilns subject to opacity limits under the NSPS requirements and that would not be subject to a PM CEM requirement under the NESHAP because they are

located at an area source cement plant, would most likely remain subject to the NSPS opacity limits. The EPA may consider a future revision of the NSPS in light of the PM CEM requirements under the NESHAP. Further, in the development of a proposal to establish the deadline for which PM CEMs must be installed and other pertinent requirements, the EPA will consider which format for the PM CEM emission limit would be most appropriate. The EPA acknowledges the technical challenges involved with precisely and accurately measuring the dry kiln feed rate continuously, and also acknowledges the issues with establishing a concentration-based limit.

20. One commenter (IV-G-6) incorporates by reference NBHC's previous communications with Joe Wood, EPA:ESD (docket items II-D-201 and II-D-207) which cautioned that although EPA would not require the use of PM CEMs if they are shown to be unreliable or otherwise inappropriate, the proposed use of PM CEMs could become the basis of independent state implementation plans or permit requirements.

Response: The final rule does require the use of PM CEMs, but defers the installation date and other pertinent requirements until a future rulemaking. The rule does not preclude state agencies from establishing their own rules regarding the use of PM CEMs.

21. One commenter (IV-D-18) stated that EPA has offered no information demonstrating that PM CEMs are more effective for determining when corrective action is needed to respond to process or control system upsets than current monitoring techniques.

Response: Upon resolution of the technical issues and analysis of data upon which to base a standard, the PM CEMs will provide a continuous indication of compliance with the PM

emission limit. PM CEMs would also serve as useful tools for assessing effects of process operation on PM emissions and PM control device performance, and thus would help when corrective action would be needed. Current monitoring techniques do not provide continuous PM data.

22. One commenter (IV-D-22) recommends that the portland cement industry and EPA jointly engage in an investigatory process to learn how to use PM CEMs on portland cement plants so that a reasonable rule might be developed in the future.

Response: The EPA and industry have worked together to develop test plans and identify test sites for a future test demonstration.

23. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) incorporated by reference the APCA comments on the proposed requirement that HW burning cement kilns use PM CEMs to demonstrate compliance with the proposed PM standard. (These comments were provided as attachment D to docket item IV-D-26). The commenters question the implicit assumption that there is a consistent relationship across the cement industry between PM emissions and metal HAP emissions. Raw materials processed in cement manufacturing can be variable, both across the industry and at individual cement plants, preventing the establishment of a consistent metal/PM emissions relationship. The lack of this relationship has a bearing on the merits of using PM CEMs for direct compliance instead of as a indicator of APCD performance. Setting site-specific enforceable limits for PM under section 112 (where, perhaps, a site-specific PM/metal HAPs correlation could be roughly

established) would violate the provisions under section 112. Such an action departs from the requirement that EPA set MACT standards for categories or subcategories.

Response: With regard to the metals issue, the EPA agrees that the HAP metals content of PM will be variable across the industry and at an individual plant over time. See the response to comment 5.2.6 and 5.2.8 explaining the use of PM as a surrogate for metals. With regard to site-specific PM limits, this was a comment on the HWC MACT notice regarding the use of PM CEMs, and was incorporated by reference as a comment to this NESHAP pertaining to NHW cement kilns. The EPA/OSW notified the public that it is considering this approach of site-specific PM CEM limits for HWCs. See above response to comments 1-5 of this comment 6.2.3. As discussed in that response, we acknowledge the need to resolve issues related to implementation of the CEM requirement, and the relation of the CEM requirement to the PM emission standard.

6.2.3 Comment: Comments on monitoring emissions of HAP metals are listed below.

1. One commenter (IV-D-16) noted that just as PM is not a valid surrogate for metal HAPs, monitoring PM is not a valid surrogate for monitoring metal HAPs. To accurately monitor metal HAP emissions, sources must use multimetal CEMs. If EPA contends that multimetal CEMs are not commercially available, it must provide a valid basis for this contention.
2. One commenter (IV-D-16) stated that sources must also be required to monitor crucial parameters such as the metals content in both the fuel and raw materials used, and all parameters relevant to the effectiveness of the PM control device. Moreover, all such parameters must be directly correlated to actual emission levels so

that emissions data support a compliance certification or an enforcement action (that can be extrapolated from such measurements).

Response: The EPA has no information indicating that reliable multi-metal CEMs, suitable for use with affected sources at portland cement manufacturing facilities are presently available. One reason the EPA has adopted PM as a surrogate for nonvolatile and semi-volatile metal HAP is to decrease testing and monitoring burden. Since feed and fuel metal composition is not a basis of MACT for NHW cement kilns, i.e., there are no specific metals emission limits, monitoring of these parameters would not provide information relating to compliance with the rule. See also the response to comments 5.1.3, 5.1.5, 5.2.4, 5.2.6, and 5.2.7 regarding the use of PM as a surrogate for HAP metals.

6.2.4 Comment: Comments on the use of broken bag detectors follow.

1. One commenter (IV-D-22) recommends that the use of broken bag detectors as an "early warning system" be revised so that a workable system can be developed and implemented at individual plants. The revision should consider the following:

   a. The detection limit of one mg per cubic meter is far too low to be realistic. A more realistic number is probably in the range of 3 to 10 mg per cubic meter.

      According to commenter (IV-D-23), using a detection limit of one mg per cubic meter is too low when PM emissions from these sources are not visible until PM concentrations reach about 20 or 30 mg per cubic meter.

Response: The final rule does not require the use of

triboelectric monitoring systems. (See response following issue 6 of this comment for more discussion.) However, in response to this comment, triboelectric monitoring systems have been shown to detect baseline emissions as low as 0.1 mg/dscm (0.00005 gr/dscf). Even relatively low cost bag leak detection systems have detection limits of 1 mg/dscm (0.00044 gr/dscf). The intent of bag leak detection systems is not to prevent visible emissions, it is to signal the need for maintenance or bag replacement.

b. Since baghouses at a cement plant vary in size (and the number of bags), plant management should be given the flexibility to develop a warning system that is appropriate for each baghouse.

Response: See response following issue 6.

2. One commenter (IV-D-23) believes that the proposed performance criteria for broken bag detectors (for monitoring PM emissions from certain raw mill and finish mill sources) are not appropriate.

Response: See response following issue 6.

3. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) objected to the word "absolute" in the statement in section 63.1349(c)(2)(ii) that bag leak detectors must provide output of relative or absolute PM emissions. Bag break detectors do not measure PM concentrations but are used to determine when a significant change in PM concentration has occurred. They are not continuous particulate emission monitors.

Response: See response following issue 6.

4. Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) are concerned that without clear-cut specifications for installing,

operating, calibrating, and maintaining bag leak detectors, there will be open-ended liability for cement plants. Presently, section 63.1349(c)(2)(v) states that the specifications should be obtained from available EPA guidance or, in the absence of such guidance, from the vendor. Adherence to some of the presently published guidelines might cause violations of the facility's operating permit, opacity limit, and/or emission limit. Further, requirements for entirely inappropriate or highly labor intensive routine tests could be imposed whenever a vendor chooses to publish an ill-conceived procedure in their equipment operating instructions.

Response: See response following issue 6.

5. Due to the inherent technical limitations of performing a true calibration, ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) stated that the word "calibrated" should be removed from section 63.1349 since the electronic instrument checks (included by bag leak detector manufacturers) are sufficient to confirm that the instrument is operating satisfactorily and is capable of detecting bag failures.

Response: See response following issue 6.

6. In order to avoid creating unnecessary enforcement liability due to ill-conceived bag removals, or create labor intensive checks for extremely simple and limited instruments, ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) recommend that EPA revise the proposed language in section 63.1349(c)(2) as follows.[20]

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[20] See Attachment E: Supplemental Comments of American Portland Cement Alliance on the Proposed Portland

(2) An owner or operator may demonstrate proper baghouse operation by installing, maintaining, and continuously operating a bag leak detection system in accordance with paragraphs (c)(2)(i) through (x) of this section.

(i) The bag leak detection system must be capable of detecting PM emission at concentrations of 6.0 mg per actual cubic meter (0.0026 grains per actual cubic foot) and greater.

(ii) The bag leak detection sensor must at a minimum provide output of relative PM emissions.

(iii) The bag leak detection system must be equipped with an alarm system that will activate when particulate concentrations increase to a level consistent with failure of a bag. The alarm should have a minimum delay time of 5 minutes.

(iv) For positive pressure baghouses, a bag leak detector must be installed in each baghouse compartment. If a negative pressure or induced air baghouse is used, the bag leak detector may be installed downstream of the baghouse. Where multiple detectors are required (for either type of baghouse), the system instrumentation and alarm may be shared among detectors.

(v) The bag leak detection system shall be installed, operated, and maintained in a manner consistent with, the manufacturer's written specifications and recommendations.

(vi) The initial system adjustment shall, at a minimum, consist of establishing the relative

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Cement NESHAP, prepared Air Control Techniques, P.C., June 26, 1998.

baseline output level by adjusting the instrument sensitivity and averaging period (response time) of the device and establishing the alarm set points and the alarm delay time.

(vii) The owner or operator shall not decrease the sensitivity, increase the averaging period, increase the alarm set points, or increase the alarm delay time unless the following steps have been taken:

(i). visual inspection of the probe or sensor

(ii). instrument electronic calibration check

(iii). manufacturer's routine maintenance procedures.

(viii) The instrument should be electronically checked in accordance with manufacturer's instructions.

(ix) Operators shall not check the sensitivity or alarm set points by removing a bag to simulate bag failure.

(x) The monitor should be placed in a location that minimizes electrical interference to avoid false bag failure alarms.

Response to issues 1 through 6 in comment 6.2.4: The option for use of triboelectric bag leak detection systems for monitoring fabric filter performance is not being promulgated at this time. The EPA is presently considering this issue and may propose revised bag leak detector requirements for some source categories. Those owners or operators who want to use bag leak detection systems may petition the Administrator for approval of alternative monitoring requirements under the General Provisions.

The rule requires the owner or operator to monitor the

opacity from raw mills and finish mills by conducting a daily six-minute test in accordance with Method 22, "Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Flares."

Owners or operators of raw mills and finish mills are required to initiate corrective action within one hour of a Method 22 test during which visible emissions are observed. A 30-minute Method 9 opacity test must be started within 24 hours of observing visible emissions.

6.3 Monitoring: D/F

6.3.1 Comment: One commenter (IV-D-14) noted that the proposed dioxin/furan monitoring requirements do not require a kiln operator to maintain fabric filter inlet temperatures at performance test levels. The proposed monitoring requirements would allow a kiln operator to cool kiln gases below 300°F during periodic performance tests for dioxin/furan emissions. Immediately following the performance test, the kiln operator would be permitted to increase the temperature to 400°F (per section 63.1349(d)(4)(iii) on page 14215) and operate at this temperature for the next five years (until the next performance test is due). EPA should correct this deficiency.

Response: In drafting the proposal, the EPA did not intend to allow a source to operate its PM control device at a temperature higher than the temperature during the performance test. The EPA has clarified in the final rule that the inlet temperature limit is established as and capped at the average temperature measured during the D/F performance test.

6.3.2 Comment: The EPA proposed that sources monitor only kiln exhaust gas temperature at the PM control device inlet to ensure compliance with the dioxin standard. One commenter (IV-D-16) stated that this requirement cannot assure that sources will know their actual dioxin emissions or compliance status at

all times and therefore violates sections 114 and 503 of the CAA.

Response: Since there is currently no CEM available for D/F, sources cannot know their D/F emission levels at all times. Continuous monitoring of temperature at the inlet to the PM control device is the most preferable method to monitor D/F emissions. Available data indicate a strong correlation between temperature and D/F emission levels. Sources will be required to demonstrate continuously that their kiln PM control device temperature is operated below the temperature established during the source's successful (i.e., the source's D/F emissions were below the emission limit) D/F performance test.

6.3.3 Comment: Regarding monitoring requirements for dioxins, one commenter (IV-D-16) suggested that EPA should also require combustion related CEMs (such as CEMs for carbon monoxide, oxygen, volatile organic compound, and total hydrocarbon) and temperature monitors throughout the combustion process, if technically feasible.

Response: The final rule does not require monitoring of these parameters as a means of monitoring combustion because the EPA believes that THC and CO emissions from NHW cement kilns are largely due to formation outside of the combustion zone, i.e., due to the feed materials. Thus, THC and carbon monoxide emissions might not accurately reflect combustion conditions. Therefore the EPA has not included CO monitoring requirements to ensure good combustion. However, to ensure good combustion, the final rule has been changed so that it now requires an annual inspection of the combustion system. Regarding the monitoring of temperature, available data do indicate a correlation between temperature at the inlet to the PM control device and D/F levels; however, no data were available indicating a relationship between kiln combustion zone temperatures and D/F levels.

6.3.4 Comment: Two commenters (IV-D-16 and IV-G-1) stated

that EPA should change the proposed nine-hour averaging period for the temperature monitoring requirement (used to show dioxin compliance) to ten minutes, because the EPA has recognized (in the proposed Hazardous Waste Combustor Rule) that a violation of the dioxin standard may occur if the temperature exceeds the proposed temperature limit for ten minutes. However, one commenter (IV-D-23) supports the proposed nine-hour block averaging time for monitoring compliance with the dioxin/furan standard.

Response: For the final rule, in response to comments suggesting shorter averaging periods and comments about maintaining consistency with the standards for HWCs, the EPA has dropped the 9-hour block average period and adopted temperature averaging times consistent with those of the hazardous waste combustor NESHAP (40 CFR 63, subpart EEE): a 10-minute and 1-hour averaging period.

Consistent with subpart EEE of this part, a ten-minute rolling average will be used to control perturbations in temperatures and a one-hour rolling average will be used to control the average temperature. During the performance test, the maximum 10-minute rolling average PM control device inlet temperature which occurs during each of the three runs is determined. The three temperatures are averaged to determine the 10-minute rolling average temperature parameter. This temperature limit must never be exceeded on the basis of any ten minute rolling average temperature.

In addition, the average of the one-minute average temperatures is determined for each Method 23 performance test run, and each of these 3 test run averages are averaged together to establish the temperature limit which must not be exceeded for any 60 minute period.

To establish consistency with subpart EEE, in lieu of

complying with dual temperature limits for both the 10-minute and 1-hour averaging times, sources may opt to comply on only a 10-minute averaging period basis, provided that the temperature limit is established as the average of the test run one-minute averages. Further, sources may petition the Administrator for an alternative averaging period or method for establishing operating parameter limits. (See the response to comment 6.3.10 for additional discussion of the averaging times.)

6.3.5 Comment: One commenter (IV-D-20) asked what specifically constitutes control device continuous monitoring. The EPA has defined an hourly rolling average in 266.102(e)(B)(ii) as: "the arithmetic mean of the 60 most recent one-minute average values recorded by the continuous monitoring system." The EPA also defines a continuous monitor as "one which continuously compiles the regulated parameter without interruption and evaluates the detector response at least once each 15 seconds and computes and records the average value at least every 60 seconds."

It was proposed that the APCD inlet temperature be monitored by a continuous monitor as defined by EPA and that this temperature be converted into an hourly rolling average (HRA). The HRA is to be recorded during the dioxin/furan testing as required with the maximum HRA value recorded over the test period being selected as the maximum allowable HRA temperature of the inlet gases to the APCD.

Response: The temperature must be measured and recorded continuously in a manner consistent with the requirements for continuous monitoring systems in subpart A, general provisions, and the requirements of paragraphs 63.1350(f)(1) through (f)(7) of the final rule.

6.3.6 Comment: One commenter (IV-D-20) stated that the selection of an hourly rolling average (HRA) monitor method is

consistent with the method of monitoring process parameters (i.e., flow, kiln exit temperature, CO and THC stack emissions, etc.) in the Boilers and Industrial Furnaces (BIF) rule. The BIF rule uses the HRA monitor method to avoid frequent automatic waste feed cutoffs that would create more emissions. A maximum HRA (similar to what is used in the BIF rule) provides greater flexibility in setting a facility limit but may be more restrictive than a nine hour averaging period.

Response: The averaging time has been changed from 9 hours to two averaging periods: 10-minute and 1-hour. The two averaging periods are consistent with those required in the HWC rule. (See the response to comment 6.3.4 and 6.3.10 for additional discussion of the averaging times.)

6.3.7 Comment: One commenter (IV-D-20) stated that the NHW MACT rule specifies that each exceedence of the APCD inlet temperature limit results in a violation. In this respect, the NHW MACT rule provides less flexibility to kiln operators than the BIF rule. It is important that an hourly rolling average monitoring method or longer averaging time be established for the APCD inlet temperature monitoring.

Response: The averaging time has been changed from 9 hours to two averaging periods: 10-minute and 1-hour. The two averaging periods are consistent with those required in the HWC rule, which will replace the BIF rule. Sources should plan to operate during the D/F performance test at the highest temperature they expect to occur, to give an appropriate operating envelope to assure that compliance is maintained. (See the response to comment 6.3.4 and 6.3.10 for additional discussion of the averaging times.)

6.3.8 Comment: One commenter (IV-D-20) stated that as currently written any exceedence for any reason results in a violation and hence possible fines. The EPA should explore a

method for cement kilns to avoid violations caused by exceedences that may result due to equipment failure or unforeseen process upsets such as a chain fire.

Response: Exceedences which occur as a result of malfunction are not violations if the operator has followed the written operations and maintenance plan and/or the startup, shutdown, and malfunction plan, as appropriate.

6.3.9 Comment: One commenter (IV-D-20) stated that since EPA's data do not show a linear relationship between dioxin/furan emissions and inlet APCD temperature, it would be better stated that EPA is intending to use temperature as the dioxin/furan compliance indicator.

Response: Regardless of whether there is a linear relationship or not, temperature *is* the D/F compliance indicator. Ten-minute and 1-hour temperature operating limits will be established to ensure continuous compliance with the D/F emissions standards between performance tests. An exceedance of the 10-minute or 1-hour temperature parameter is a violation of the operating limits for kilns and in-line kiln/raw mills.

6.3.10 Comment: One commenter (IV-D-20) noted that the preamble calls for the average temperature of three runs which are then averaged together. Does this not result in a lower limit than that which was achieved during testing?

Response: The EPA recognizes that by definition, most likely at least one of the test run averages will be higher than the temperature limits established, but at least one of the test run averages will be lower than the temperature limits. The source should operate the PMCD at highest anticipated temperatures during the test to give itself an appropriate operating envelope to assure that compliance is maintained.

The rule was changed to provide for a 10-minute and 1-hour rolling average temperature limit. The ten-minute rolling

average temperature must not exceed the average of the three maximum ten-minute rolling averages determined during the three runs of the successful Method 23 performance test. The 60-minute rolling average temperature must not exceed the average of each the three test run average temperatures determined during the successful Method 23 performance test. Run average temperature is defined as the average of the one-minute average temperatures for the test run.

Sources may opt to comply on only a 10-minute averaging period basis, provided that the temperature limit is established as the average of the 3 test run average temperatures. Further, sources may petition the Administrator for an alternative averaging period or method for establishing operating parameter limits.

6.3.11 Comment: One commenter (IV-D-20) stated that the average of all three runs is very different from averaging the average of each of three runs. To support this point, the commenter presents a summary of various analyses of data taken from a continuous 32-hour period recorded during a "ROC" test on a long wet kiln. The commenter concluded from his analysis that it would appear to be defensible to set the control point temperature as the maximum hourly rolling average (HRA) over the three runs, provided the maximum was not associated with a measured dioxin/furan concentration greater than 0.2 ng TEQ/dscm at seven percent oxygen. This provides the flexibility of staying below a maximum limit demonstrated during the testing rather than an average for which a kiln would be out of compliance half of the time.

Response: If the three runs are of equal duration there is no difference. There is no justification for weighting a slightly longer duration run, more heavily than the other runs. The kiln will never be out of compliance if every 10-minute and

1-hour rolling average temperature is at or below the established operating parameter. Higher temperatures result in higher D/F emissions. See the previous response to comment.

6.3.12 Comment: One commenter (IV-D-20) noted that the monitoring language does not specify monitoring locations other than "inlet." What if the temperature indicator is actually before the inlet to the PMCD rather than right in the inlet?

Response: The temperature sensor can be anywhere between the kiln and the PM APCD inlet, but the sensor location during routine operation must be the same as during the performance test.

6.3.13 Comment: One commenter (IV-D-20) noted that 63.1349(d) of the proposed rule mentions nine-hour block averaging. This needs to be consistent with other related language in the proposed rule including the testing requirements.

Response: The averaging time has been changed from 9 hours to two averaging periods: 10-minute and 1-hour. The two averaging periods are consistent with those required in the HWC rule. See previous response to comments.

6.3.14 Comment: One commenter (IV-D-20) stated that EPA needs to specify monitoring details in 63.1349(d)(4)(ii) such as one reading per minute or four per hour, etc.

Response: The temperature must be measured and recorded continuously in a manner consistent with the requirements for continuous monitoring systems in subpart A, general provisions, and the requirements of paragraphs 63.1350(f)(1)(i) through (f)(1)(iv) of the final rule.

6.3.15 Comment: One commenter (IV-D-20) stated that section 63.1349(d)(5) of the proposal calls for "calibration of all thermocouples and other temperature sensors" when it should only be those associated with the PMCD inlet temperature. Also, is this a full calibration or simply a calibration check?

Response: All thermocouples and other temperature sensors used to establish compliance with this NESHAP must be calibrated consistent with the requirements for continuous monitoring systems in subpart A, general provisions, and the requirements of paragraphs 63.1350(f)(1)(i) through (f)(1)(iv) of the final rule.

6.3.16 Comment: Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and IV-G-6) recommend that the dioxin/furan monitoring requirement be amended to change from the definitive nine-hour block to a block not to exceed nine hours in length. This change would allow cement manufacturers to use an eight-hour block if desired, to better conform with normal recordkeeping practices (that typically follow three eight-hour operating shifts) at cement plants.

Response: The averaging time has been changed from 9 hours to two averaging periods: 10-minute and 1-hour. The two averaging periods are consistent with those required in the HWC rule. Sources may petition the Administrator for an alternative averaging period or method for establishing operating parameter limits.

6.3.17 Comment: One commenter (IV-D-20) asked how compliance would be met during the transition between when the raw mill is turned on or off. The heat from a hotter temperature may take a while to dissipate and achieve the cooler temperature.

Response: The final rule has been clarified. After a transition period in which the status of the raw mill was changed from "off" to "on" or from "on" to "off", compliance with the operating limits for the new mode of operation begins, and the 10-minute and 60-minute rolling average is established anew, i.e., without considering previous recordings.

6.3.18 Comment: One commenter (IV-G-5) noted that the emissions standards sections 63.1343(b)(3),(c)(3) and (d) of the proposed rule specify no averaging time. Since the EPA developed

the dioxin/furan limits from data generated over three 3-hour test runs, these subsections should be amended to provide that the dioxin/furan limit is based on a nine-hour averaging period.

Response: All of these are based on the performance test durations. The required performance tests and durations are specified in section 63.1349(b)(3) in the final rule.

6.4 Monitoring: THC/Organic HAPs

6.4.1 Comment: One commenter (IV-D-15) noted that carbon monoxide (CO) and THC are often used as surrogates for each other to monitor proper combustion. The same kiln conditions that minimize organic HAP emissions by keeping CO low will keep THC low. The commenter (IV-D-15) suggested that if the final NESHAP retains the requirement to monitor combustion, the NESHAP should be revised to allow either CO or THC monitoring.

Response: The composition of kiln exhaust gases does not necessarily reflect combustion efficiency because the THC and CO emissions most often result from feed materials. CO is generated by the calcining process and THC/organic HAP may be volatilized from the feed materials. Further, the THC limit was proposed to reduce emissions of organic HAP originating from feed materials, and not as a combustion control parameter. To ensure good combustion, the final rule has been changed to include a monitoring requirement for an inspection of combustion system components to be conducted at least annually.

6.4.2 Comment: One commenter (IV-D-16) stated that since THC is not a valid surrogate for organic HAPs (in that the organic HAP content of THC emissions varies from zero to ninety-eight percent), monitoring THC is not a valid surrogate for monitoring organic HAPs. The use of THC monitoring will deny the public, and particularly the neighbors of portland cement kilns, their right to know the identity and quantity of HAP emissions to which they are exposed.

Response: The range of zero to 98 percent organic HAPs "in" THC is a result of measurements at different facilities. The EPA has proposed the use of THC as a surrogate for organic HAP to reduce the burden of performance testing and monitoring. No organic HAP CEMs are in use, however, THC CEMs are widely used. A surrogate for which a reliable CEM is available is preferable to a compound specific performance test at infrequent intervals. One reason the EPA has adopted THC as a surrogate for organic HAP as a means to reduce the burden of testing and monitoring.

The issue of the suitability of THC as a surrogate for organic HAP was presented when EPA adopted standards for boilers and industrial furnaces burning hazardous waste, and in the course of that rulemaking, not only the Agency but the Science Advisory Board concluded that THC was indeed a reasonable surrogate for toxic organic emissions from cement kilns. [See 56 FR at 7153-54 (Feb. 21, 1991).] See the response to comment 5.4.2.

6.4.3 Comment: One commenter (IV-D-16) stated that the proposed thirty-day averaging period for THC CEMs is illegal because sources must comply with emission standards continuously according to section 302(k). EPA's rationale for the thirty-day period, that sources may take a long time to consume high THC feed stocks, essentially concedes that sources may be out of compliance during the averaging period. The EPA has no authority to sanction non-compliance and may not do so indirectly by allowing excessive averaging periods.

Response: The final rule requires greenfield raw material dryers, greenfield kilns, or greenfield in-line kiln/raw mills to be in continuous compliance with the proposed THC emission standard, that is based on a thirty day average. (See the response to comments 5.4.3.1 through 5.4.3.3 for a discussion of this change in applicability of THC limits. In the final rule,

the THC limits apply only to greenfield sources.) Numerous emission standards (including the Coke Oven Battery NESHAP, 40 CFR 63, subpart L and the Printing and Publishing NESHAP, 40 CFR 63, subpart KK) have been promulgated with this averaging period. The required continuous monitoring for THC will permit operators of new greenfield sources sufficient time to take corrective action.

As stated in the proposed rule, the rationale for the 30-day block averaging time is that the organic content of the feed material may vary with quarry or mine location. Once raw material storage bins are filled with high organic content feed material and an excursion is experienced, it may take a considerable amount of time to consume these already stored feed materials and locate/obtain feed materials with lower organic content.

6.4.4 Comment: One commenter (IV-D-25) stated that EPA should consider a process for granting an "equivalency determination," during the permitting process, to NHW (and HW) kilns that have high organic content in their raw material. An "equivalency determination" allows kilns to demonstrate an alternative method of monitoring good combustion. (See IV-D-25 for an explanation of "equivalency determination.")

Response: The THC standard is not based on combustion but rather on limiting emissions of THC/organic HAPs which are volatilized from the feed materials. An equivalency determination does not address THC of this origin.

6.5 Monitoring: HCl

6.5.1 Comment: One commenter (IV-D-16) stated that EPA must require HCl CEMs to ensure compliance with HCl standards (that EPA should have established based on available emissions data). Hydrogen chloride CEMs are commercially available and will provide the only effective means for sources to comply with

sections 114 and 503.

Response: The CEMs are not necessary for monitoring, as there is no standard with which compliance must be demonstrated. The only time that HCl stack emissions may be measured is during major source determinations. (See the response to section 2.5 comments for a discussion of test methods for measurement of HCl stack emissions.)

7. PERFORMANCE TESTS

7.1 Performance Test: General

7.1 Comment: One commenter (IV-D-16) noted that EPA's testing proposal for nonhazardous waste kilns is inexplicably weak when compared to similar sources for the same pollutants and on its own merits. No explanation was provided as to why nonhazardous waste cement kilns would undergo performance testing every five years to ensure compliance with kiln PM and dioxin emission standards, while hazardous waste cement kilns would undergo performance testing every three years for PM and 18 months for dioxin emissions. Also, municipal waste combustors (MWCs) undergo more frequent testing for dioxin and metals.

EPA's reasons for proposing dioxin testing every 18 months at hazardous waste cement kilns include: dioxin toxicity, lack of continuous emissions monitoring for dioxins, the lack of a feedrate limit associated with dioxin emissions, and equipment wear over time which could result in increased dioxin emissions even though the source stays within operating limits. All of these factors apply to nonhazardous waste cement kilns. Many nonhazardous waste cement kilns are extremely old and particularly susceptible to equipment malfunction.

Accordingly, the testing portion of the proposed rule fails to ensure compliance with appropriate emission standards and protect human health and the environment.

Response: The Agency reconsidered the performance test frequency for NHW cement kilns. The final rules for HW and NHW cement kilns include identical performance test frequencies for PM and D/F emissions. The PM performance test frequency (of every five years) is synchronized with the requirements for Title V permit renewals. In response to this comment, and based on comments received that there should be consistency with the requirements for HW kilns, the final rule requires that the

performance tests for D/F must be conducted every two and one-half years.

To further achieve consistency with the HW cement kiln standards, and to assure that NHW kilns continue to achieve the requisite emissions reductions reflected in the standard, EPA clarified in the final rule that in addition to repeating PM performance tests every five years (or 2.5 years for the D/F performance tests), PM and D/F performance tests for kilns or in-line kiln/raw mills must be repeated within 90 days of initiating any significant change in the feed materials or fuels fed to the kilns (This would include, but it is not limited to, the following examples: a switch from burning one type of fuel to another, such as natural gas to coal; or an increase in the input rate of waste fuels such as municipal solid waste, tire-derived fuel, or medical waste to the kiln or in-line kiln/raw mill above the rate used in the previous performance test). Such changes in fuels could result in changes to emissions.

7.2 Performance Test: PM/HAP Metals

7.2.1 Comment: One commenter (IV-D-13) suggested that in the first sentence of paragraph 63.1348(b)(1)(i), use of the abbreviation "EPA" before the text "Method 5 of appendix A to part 60" was unnecessary.

Response: This has been removed from the final rule.

7.2.2 Comment: Commenter (IV-D-13) suggested that in the last sentence of paragraph 63.1348(b)(1)(l) of the proposal it was not necessary to state that

> "analysis of the back half of the Method 5 particulate sampling train is not required"

since Method 5 (by definition) does not designate the analysis of the "back half" as part of the official method. However, one commenter (IV-D-28) stated that sections 63.1348(b)(1)(i) and 63.1354(b) should be revised to clarify that states and local

agencies may require a back-half analysis with Method 5 testing (for Title V permitting, emission fees, PM_{10} modeling, etc.) but the back-half result shall not be used for determining compliance with the subpart LLL particulate limit.

Response: The final rule has been changed as suggested by commenter IV-D-28, as this clarifies the intended requirement.

7.2.3 Comment: Commenter (IV-D-13) requested that in paragraph 63.1348(b)(1)(ii) EPA describe how kiln or in-line kiln raw mill feed rate should be measured in terms of:

-what is to be done

-by what means

-expected accuracy

-must a separate determination be made for each test run?

Response: A separate determination should be made for each run. Permitting authorities can reject test plans if they are not satisfied with the measurement technique. Enforcement of the NSPS PM standard includes review of procedures provided in an acceptable test plan, and a similar approach is required by the NESHAP general provisions and expected in enforcement of the NESHAP. Docket item II-A-1 provides guidance on feed rate measurements.

7.2.4 Comment: One commenter (IV-D-28) suggests that particulate tests be conducted at least once every 24 months. Cement kilns are substantial sources of PM and significant deterioration in the efficiency of the APCD may occur during the proposed five-year period. The cost of Method 5 testing every two years should not place an undue burden on the industry.

Response: Performance test frequency for PM is synchronized with requirements for Title V permit renewals. Continuous opacity monitoring is also required for kilns and clinker coolers to ensure that the MACT floor level of particulate HAP control is continuously achieved.

7.2.5 Comment: One commenter (IV-D-35) agrees that demonstrating initial compliance and compliance every five years thereafter (with PM emission limits) with Method 5 is appropriate.

Response: The EPA acknowledges that the PM compliance demonstration (as described in the response to comment 7.2.4) is appropriate.

7.3 Performance Test: D/F

7.3.1 Comment: Commenter (IV-D-13) requested that EPA clarify in paragraph 63.1348(b)(4)(i) whether EPA intended the sentence

"the arithmetic average concentration measured during each of three runs shall be used to determine compliance"

means either (1) the three average values for the three runs was to be used to calculate a grand average for all test runs, or if (2) EPA intended that each run would determine compliance.

One commenter (IV-D-35) supports EPA's decision to use the arithmetic average concentration of the three runs to determine compliance since this is realistic and allows for the variation of emissions over time, unlike the proposed HWC rule where all runs must pass to demonstrate compliance.

Commenter (IV-D-20) noted that the 63.1348(b)(4)(i) arithmetic average language is not consistent with the 63.1348(b)(4)(ii) language or page 14205 of the preamble.

Response: Compliance is demonstrated as the average of the three test run averages, and each run by itself does not determine compliance. The final rule and preamble have been clarified.

7.3.2 Comment: Commenter (IV-D-13) requested that EPA clarify in paragraph 63.1348(b)(4)(iii) how the carbon injection rate should be measured. The clarification should address the following issues:

-is the measurement continuous or intermittent

-specify measurement accuracy

-identify methods to collect and weigh the carbon

-will the same methods be used during the initial compliance testing and subsequent monitoring requirements in paragraph 63.1349(e)(1)?

Response: Monitoring requirements for those affected sources that choose to use ACI to comply with the D/F standard have been clarified in the final rule in section 63.1349(b)(3)(vi) through (ix) for performance tests and in section 63.1350(g)(1) through (g)(7) for monitoring requirements. For consistency with the HWC rule, the carbon injection rate averaging time was changed from 15 minute block averages to 10 minute and 60 minute rolling averages. The final rule's preamble also clarify the requirements. The operator must install, operate, calibrate and maintain a device to continuously monitor and record the weight of activated carbon injected and record the weight in 10 minute and 60 minute rolling averages. The accuracy of the weight measurement device must be $\pm$ 1 percent of the weight being measured. The operator must verify the calibration of the device at least once every three months and record the activated carbon feeder setting once each day. Operation of the injection device during routine operation must be the same as during the performance test. Further, the ACI nozzle carrier fluid flow rate or pressure drop is to be monitored continuously, according to manufacturers' specifications.

7.3.3 Comment: Commenter (IV-D-20) noted that the arithmetic average also refers to a "concentration" yet TEQ is widely used throughout the proposed rule. This needs to be clarified.

Response: The preamble and the definitions section of the rule state that all D/F measurements are converted to TEQ. TEQ

is expressed in concentration units.

7.3.4 Comment: One commenter (IV-D-28) suggests that, based on their comment 7.2.4, that the Method 23 testing frequency for dioxin/furans be changed to once every 48 months, so that the timing of the dioxin/furan testing would coincide with every second PM test.

Response: As discussed in the response to comment 7.1, the performance test frequency for D/F was changed from every 5 years to every 30 months in the final rule. Temperature monitoring is used to determine compliance between tests. States are free to require more frequent testing.

7.3.5 Comment: Since there were questions on whether dioxin/furan emissions increase with the raw mill off, Medusa-Citadel conducted dioxin/furan stack emissions testing with the raw mill on and off in September 1997 (a data summary is on page 11 of docket item IV-D-35). Since these tests indicate that dioxin/furan emissions are not impacted by mill-on/mill-off operating scenarios, one commenter (IV-D-35) recommends that EPA only require mill-on/mill-off for the initial compliance test. Subsequent tests need only monitor for dioxin/furan during one mode of operation or operating scenario (i.e., either mill-on or mill-off).

Response: The EPA considers that one set of test data is insufficient to conclude that there is no impact. Gas characteristics including temperature differ sufficiently as a result of raw mill status to warrant that tests be conducted under both modes of operation.

7.4 Performance Test: THC/Organic HAPs

7.4.1 Comment: Regarding paragraph 63.1348(b)(5), commenter (IV-D-13) suggested that EPA state that according to PS 8A that the accuracy of the THC CEM be established with Method 25A.

Response: The THC CEM must be installed and operated in

accordance with PS-8A, and is subject to the CEM audit and quality assurance requirements of the General Provisions.

8. TEST METHODS 320, 321, AND 322

8.1 Comment: One commenter (IV-D-17) stated that EPA's actions (ir proposing the precursor to EPA Fourier Transform Infrared Spectroscopy (F directly conflict with the guidance of and directives of the 1995 Nationa and Advancement Act and the Office of Management and Budget (OMB) Circula American Society of Testing and Materials (ASTM) FTIR consensus based tes and (2) the EPA Emission Measurement Center (EMC) representatives were ma development of the ASTM method and chose duplicative measures in developi precursor to EPA FTIR test method 320. (The OMB Circular states specific voluntary consensus standards body is in the process of developing or adc consensus standard that would likely be lawful and practical for an agenc developed on a timely basis, an agency should not be developing its own s standard and instead should be participating in the activities of the vol standards body.")

Response: The Agency has been actively developing extractive FTIR-based methods for HAPs since 1992. Methods 320 and 321 are direct products of this long-term effort to apply an innovative approach to emissions measurement in the form of extractive FTIR. The Agency has tested these methods in the laboratory and in the field extensively (conducting testing at two portland cement facilities), and has conducted multiple validation tests of these methods. The Portland Cement Association (PCA), in representing various members of the regulated industry, has conducted its own series of validation tests of these methods. Actually, Method 321 was developed and validated by PCA, and has been adopted by the Agency as Method 321. Agency personnel informed ASTM in 1996 that the Agency methods were in active development, and an ASTM standard

seemed redundant. Additionally, the ASTM standard has not undergone field validation, which is essential in establishing the precision and accuracy of any test method.

The Agency has conducted a review of the ASTM method. While the ASTM method is in some ways similar to Method 320, the ASTM method is not sufficiently detailed to document proper application, and does not contain the quality assurance procedures the Agency requires in compliance methods. Specifically, the ASTM method does not address specific calibration transfer standards, nor does it address the preparation of reference spectra. Therefore, EPA has determined that it is impractical to adopt the ASTM method at this time and is promulgating Method 320.

8.2 Comment: Commenters (IV-D-17) stated that, in light of the 199 Technology Transfer Act and OMB Circular A-119, EPA should withdraw propo the ASTM FTIR test method by reference for use in the final regulations f industry and any other appropriate applications. The ASTM standard will b the EPA promulgates its final rules limiting HAP emissions from the portl Ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV- and IV-G-6) stated that EPA should withdraw proposed Methods 320 and 321 the ASTM FTIR standard.

Response: See the response to comment 8.1.

8.3 Comment: One commenter (IV-D-20) stated that the hydrogen chloride results from proposed test Methods 321 and 322 require equipment by Ph.D. chemists which is clearly impractical.

Response: The Agency agrees that measuring hydrogen chloride emissio Cement kilns following test method 321 requires well trained operators. preclude their use. The Agency and industry contractors conducted tests personnel, and did not need doctorate-level spectroscopists to run the te

8.4 Comment: One commenter (IV-D-21) noted that while the proposed methods are state-of-the-art and the "best" way to measure the pollutants

testing is beyond the means of most portland cement sources.

Response: The Portland Cement Association, in conjunction with EPA, method for HCl, and has conducted testing at various facilities utilizing the Agency agrees that the FTIR is state-of-the-art, several testing comp technique as part of routine testing, and the cement industry has success use.

8.5 Comment: One commenter (IV-D-23) stated that the proposed prot Methods 320 and 321 differ markedly, in some instances, from industry-pre were submitted to EPA in 1995. The commenter recommends that EPA revise to address industry concerns listed in Attachment F to docket item IV-D-2 contains comments on the three proposed test methods and on HCl testing. summarized from Attachment F on the proposed test methods start at commer

Response:

8.6 Comment: In Attachment F (to docket item IV-D-26), ten comment IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, IV-G-3, IV-G-4, and of the ASTM FTIR Standard Test Method (which was derived from numerous in protocols, including the PCA Protocols) will:

1. force standardization of FTIR testing
2. enable non-FTIR experts to verify that valid data are collected test, in contrast to proposed Methods 320 and 321 that are not definitive to ensure that independent observers can determine t of the data
3. contain sufficient QA/QC so that post-test submittal of interfe independent analyses is not necessary.

Response: The Agency disagrees with the commenters that only the sub will allow for standardization of FTIR testing. The purpose of EPA test incorporate uniform testing procedures, which in turn insures uniform dat setting and in source compliance demonstration. Therefore, it is vitally testing procedures are used in Agency data collection and in compliance d The Agency disagrees that Methods 320 and 321 will not allow the verifica collection during the test. While only a thorough test report review wil

valid, the EPA methods require spiking of target compounds in the field, operator and on-site regulatory observer to make judgments as to initial disagrees that its methods will require post-test independent verificatic independent audit procedure is an allowed option in all test methods, and FTIR. As in other methods, the best way to verify that valid data have b all spectral data, thoroughly document all procedures and test conditions and make the data and documentation available for independent technical r

8.7 Comment: General remarks by ten commenters (IV-D-22, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-29, IV-D-35, I-G-3, IV-G-4, and IV-G-6) on test methods 320 and 321 follow.

1. In section 1.4 of proposed Methods 320 and 321, the definitions in the FTIR Protocol are not consistent with traditional source testing nomenclature. The minimum analytical uncertainty (MAU) identified in the methods and in the FTIR Protocol is not a true measure of instrument sensitivity. A procedure for determining the reasonably expected detection limit is needed.

Response: Methods 320 and 321 do not state that the MAU represents a practical detection limit. The methods and the Protocol that is cited in the methods indicate that quantitation limits are analyte and matrix dependent. The approach cited in the Protocol is to specify a required detection limit, configure the system to meet the requirement, and then analyze actual field test spectra to evaluate whether the requirements were met (Appendices I and J of the FTIR Protocol).

2. A general statement regarding method precision and accuracy is needed in section 1.4.

Response: A general statement of precision and accuracy would not be applicable in the case of these methods. The FTIR technology can be used in many applications and can be configured in many different ways such that a general statement would have little meaning. The EPA procedures require the user to

demonstrate data criteria in each use of the method. The calibration transfer standard measurements demonstrate the minimum precision, while the spiking procedure demonstrates the sampling bias of the analyte measurements. Precision and accuracy requirements will vary with application and need.

3. It is unclear from the methods, which FTIR Protocol procedures are required to be conducted before each test, and which are required to be conducted only once.

Response: The Agency disagrees with the commenter on the wording of the methods. Indeed, various members of industry have followed these methods and have submitted data demonstrating that they completed the requirements of the methods.

4. Standardized Method 320/321 data sheets need to be developed.

Response: The Agency has provided data sheets with the specific documentation required in each method. Since Method 320 is generic as to the pollutants or sources which may use it, it has different requirements than the source-specific Method 321. Therefore, standardized data sheets would not be universal to both methods.

5. True performance based methods should not state the following.
   a. the required use of EPA reference spectra in sections 2.3, 4.6, 7.3, and 11.0, since any reference spectra library should be tolerated as long as the method QA/QC is met.
   b. in section 2.4, that the FTIR operator shall be trained in setting up the instrument etc.
   c. in section 8.1.4, calculation of fractional reproducibility uncertainty (FRU).
   d. in section 8.2, leak-check procedures.

e. in sections 8.5, 8.6.1, 8.7.1, and 10.5, statements specific to a particular sampling system configuration.

Response: The goal of performance-based methods is to allow the source flexibility in using various sampling and analytical options while still maintaining the goal of quality uniform data across a wide number of potential method users. The method allows the use of other sampling system configurations, various methods of data validation, the use of any number of spectral libraries (within the confines of documented data quality procedures), and various options in term of data reduction. The Agency believes these choices fall well within the definition of performance-based methods.

8.8 Comment: Remarks by ten commenters (IV-D-22, IV-D-23, IV-D-24, 26, IV-D-29, IV-D-35, I-G-3, IV-G-4, and IV-G-6) on test method 320 follo

1. In sections 2.1.5, 3.25, 3.26, 3.27, and 3.29, a discussion reg transferability must be included. Specific issues to address i following:
   a. when are the self-validation procedures sufficient?
   b. what are the parameters that are used to determine whether similar to another?
   c. when can the validated analytical routine be transferred f source?
   d. can the analytical routine be changed upon transference to source, and if so what are the limitations to the changes?

Response: The issue of transferability is both matrix and analytical Transferability must be applied on a case-by-case basis. For FTIR method the most important factor in determining which sources are similar is the composition. The EPA Protocol (cited in Method 320) addresses the issue requiring the tester to perform data quality demonstrations. The method procedures as an additional performance check. These demonstrations indi

configuration was suitably applied to a different source.

2. Sections 2.2.2, 9.0, and 9.2, on the analyte spiking technique, that the analytical program can give erroneous results.

Response: The Agency disagrees with the commenter. The EPA Protocol address the accuracy of the analytical results. Each user of these metho accuracy of their results and must be prepared to subject the data and re technical review.

3. Section 2.4 should also define what the appropriate corrective the initial sample spectral analysis does not reveal a suitable configuration.

Response: Since this method is not source-specific, and may be appli stack gas matrices, it would be impossible to prescribe corrective actior

4. Section 3 should define the terms “sample conditioning” and “sc

Response: Since users of this method should be scientists who are fa basic stack test sampling, these terms should be familiar to them.

5. It would be helpful to include in section 3 the definitions from the FTIR protocol so that readers do not have to flip back and forth between definition sections.

Response: The Agency believes that incorporating the Protocol into the method would detract from the clarity of the procedures, and believes printing the definitions in both documents is unnecessary.

6. Section 3.24 should state that FTIR measurements should be cont upscale asymptote is reached and the data are stable.

Response: The Agency believes this suggestion is not practical in ca concentration varies and a true upscale asymptote may not be reached. F ideal for continuously monitoring variable emissions. Since many sources requirement would disallow the use of

the technique at too many sources, without adding appreciably to the qual

collected.

7. The definition of the term “surrogate” in section 3.29 is wrong cannot be less reactive or less soluble than the analytes it re

Response: The use of a surrogate is a rare event when the target ana prepared as a spike standard due to its chemical and physical properties. compounds that Method 320 can be utilized for is so extensive, there is t circumstances where a surrogate that is less reactive, less soluble, or m acceptable. The suitability of the surrogate will be addressed on a case depend on any number of conditions, including source gas matrix, the prop analytes, the sample conditioning system being used, etc.

8. Section 4.1.1 defines background interference but should instea stability.

Response: The Agency notes that the calibration transfer standard is sample stability, not background interference.

9. The procedures in section 8.3 discusses only detector non-linea eliminated by linearization circuits in most new FTIR systems. corrections for inherent instrument non-linearity must be made analytical method.

Response: The Method does not specify the age of the instrument; sin performance-based method, any instrumental system which meets the data qu the method will be allowed. The EPA Protocol requires the user to calcul linearity of the target analyte reference spectra, and correct for non-li

10. In section 8.4, all spectra that can be generated from others s or absorbance need not be saved.

Response: The Agency disagrees with the commenter for a number of re analyst may wish to regenerate the absorbance spectra from the interferog parameters, the data reviewer should be able to review the original absor saved during the field test, and the data reviewer should be able to veri absorbance spectra can be reproduced from the interferograms. Since a va

high-capacity data storage systems are commercially available, the Agency
of data storage outweigh the costs involved.

11. Section 8.5.1 infers that these compounds are interferences. In some circumstances, these compounds can also be target analytes.

Response: The Agency agrees that any compound can potentially be an interferant, an analyte, or both. The EPA Protocol guides the user in determining what is an interferant. The compounds identified in Section 8.5.1 are frequently encountered as interferents, and this section just guides the user in pointing them out.

12. Section 8.5.2 and section 13, which discuss the concentration level of the spike, should be identified as guidance.

Response: The spiking procedure is critical in determining the quality of the data collected, and therefore, the range of concentration given in the method for spike levels is reasonable. Spike levels should be in the range of the target analyte in order to determine the validity of the collected data in the target measurement range.

13. The commenters object to the potential use of correction factors from the Method 301 validation test in sections 8.6.2 and 13.4.2.

Response: The Agency believes that correction factors are needed in order to correct for biases discovered in the measurement method. Since the spiking procedure is used to determine method bias, the use of a correction factor is appropriate in reporting the true value of pollutant present in the stack gas.

14. The commenters object to the term “CEM sampling” in section 8.7 test methods” in section 2.4.2.

Response: The Agency has replaced the use of these terms in the meth

15. In section 8.11, procedures for corrective actions should be of
when the instrumental parameters were not appropriate.

Response: The method offers general guidance for corrective action.
inappropriate to specify correction actions since any number of correctiv
suitable remedy in a given situation. The user of the method should be t
select a suitable remedy, and the method requires that the user demonstra
performance of the instrument once corrective action is taken.

16. Section 9 calculations in proposed Method 320 differ from those
321.

Response: The Agency agrees with the commenter and has corrected the
321.

17. Section 9 must address the analyte spike concentration
relative to the actual native concentration of the
particular analyte.

Response: The analyte spike concentration was discussed in the respo
8.8.12 and is specified in Section 8.6.2.

18. Equation 320-4 does not account for the presence of native anal
(of the same compound spiked).

Response: The Agency agrees with this comment and has modified equat

19. Section 9.2 should state that the analyte spiking procedure che
sampling and analytical systems. The section should also state
should be continued until a clear asymptotic result is reached.

Response: The wording of Section 9.2 has been modified to include th
The second part of this comment was addressed in the response to comment

20. In section 9.2.2, waiting for a period of twice the duration of
time" seems unreasonable.

Response: The Agency disagrees that twice the response time is an ur
Section 9.2.2. The wait is necessary in order to allow for a stable sign
data.

21. A requirement to calibrate mass flow meters on-site before each included in the spiking section.

Response: The Agency does not believe that mass flow calibration on-since dilution is actually determined by the tracer gas measurement.

22. A pressure correction variable should be included in equation 320-6.

Response: The Agency agrees with the commenter, and equation 320-6 has been modified to correct for variations in pressure.

23. Section 12.2.4 should note that it is also important to determine the extent to which the pressure of the reference spectra varies relative to the pressure of the actual samples.

Response: The Agency has addressed this comment by the corrections mentioned in Section 8.8.22. The EPA Protocol addresses this issue in Appendices H and I.

24. Section 13 attempts to modify Method 301 for the purposes of co analyte spiking procedure within this method. Method 301 shoul formally to reflect these procedures instead of making modifica other methods.

Response: The Agency disagrees that this section seeks to correct Me does not contain a procedure for validating vapor phase instrument measur this section is needed in Method 320.

8.9 Comment: Remarks by ten commenters (IV-D-22, IV-D-23, IV-D-24, D-26, IV-D-29, IV-D-35, I-G-3, IV-G-4, and IV-G-6) on test method 321 fol

1. Statements in section 1.0 that proposed Method 321 can be used emissions "both before and after" particulate matter control de unnecessary.

Response: The purpose of this statement is to determine the applicability of the test method to various sources, and the Agency believes is helpful to potential users.

2. Section 4 needs a more complete discussion of the ammonia inter

Response: The Agency believes that this section provides an adequate discussion of ammonia interference.

3. Discussions should be added in section 6.3 of on-site field cal mass flow meters.

Response: This issue has been addressed in the response to comment 8.8.21.

4. Section 6 should also specify the use of purgeable HCl regulato

Response: Use of purgeable regulators for HCl are to extend the life of the regulator, with which knowledgeable testers should be familiar.

5. Section 7.0 should discuss the concentration level of the spike.

Response: This issue has been addressed in the response to comment 8.8.17.

8.10 Comment: Remarks by ten commenters (IV-D-22, IV-D-23, IV-D-24 D-26, IV-D-29, IV-D-35, I-G-3, IV-G-4, and IV-G-6) on test method 322 fol

1. The QA limits (for calibration error and sampling system bias) terms of the emission standard instead of as a percentage of in Since there is no emission standard for HCl, the absolute QA cr ppm HCl) for calibration error and bias must be used. It is no these absolute QA criteria consistently with current measuremen Expressing QA limits in terms of measurement span is consistent instrumental test methods, CEMs regulations, and analyzer manuf specifications. Thus, in sections 8.1, 8.2, 9.1.2.2, 9.1.3.2, should select the instrument span based on the emission standar QA criteria as a percentage of the span.

Response: See response following comment 8.10.14.

2. The instrument span criterion in section 1.3 (select the range of the effluent measurements is between 25 and 75 percent of sp include the following sentence. "For sources with effluent con

than 25 ppm, a measurement range of 0 to 50 ppm may be used." needed for the following reasons.

a. HCl concentrations vary among cement plants.

b. HCl concentrations may be so low that there is not an anal sufficient sensitivity to meet section 1.3.

c. Current measurement techniques do not allow for ranges wit sensitivity than 0-50 ppm.

d. a range of 0-50 ppm should provide sufficient sensitivity major source status.

Response: See response following comment 8.10.14.

3. There are several problems with the calibration correction equa equation 1 in the PCA Protocol is correct and has become an inc procedure for instrumental testing and CEMs calibration correct proposed equation 322-1 is incorrect due to a transposition of within the equation. Third, even if the proposed equation is c clear that it would improve the accuracy of results relative to equation and it could worsen the accuracy depending on the circ proposed equation 322-1 should be replaced with equation 1 from

Response: See response following comment 8.10.14.

4. A flaw in the analyte spike procedure was discovered during rec tests. The problem is that when the native concentration contr the expected value than the spike gas, the QA criterion of 70 t inappropriate. The method should limit the ratio of the spike concentration in the spike sample to a range of 0.8 to 1.2, exc the native concentration is near the detection limit of the mea At native concentrations near the detection limit, the spike co should be calculated using the concentration corresponding to t for the test. The decision point concentration can be based or standard in the case of a compliance test, or it can be based c necessary for the unit to be defined as a major source of HCl e

9.3.1 should be revised to the language provided by the comment to docket item IV-D-26.

Response: See response following comment 8.10.14.

5. Since there are no analog computers, section 3.1.3 should read recorder, computer, or digital recorder for recording measureme analyzer output."

Response: See response following comment 8.10.14.

6. Section 3.3 should read "A known concentration of HCl gas in ar diluent gas (i.e., N_2)."

Response: See response following comment 8.10.14.

7. Revise section 3.5 to the language provided by the commenters i docket item IV-D-26.

Response: See response following comment 8.10.14.

8. When it can be conducted, a true bias test will indicate any problems with the sample conditioning system. Field experience with this method has shown frequent problems with sample conditioning.

Response: See response following comment 8.10.14.

9. Revise section 6.1.2 to the language provided by the commenters in Attachment F to docket item IV-D-26.

Response: See response following comment 8.10.14.

10. Revise the phrase in parentheses in section 6.1.4 to the language provided by the commenters in Attachment F to docket item IV-D-26.

Response: The proposed rule already contains the suggested text.

11. Revise section 9.2.4.2 to read "If both the zero and upscale calibration values are within the sampling system bias specification, then use the average of the initial and final bias check values to calculate the gas concentration for the run."

Response: See response following comment 8.10.14.

12. Revise the fourth sentence in section 9.3 to read "The HCl spik
be between 70 and 130 percent as calculated using equations 2 a
method."

Response: See response following comment 8.10.14.

13. In section 10, add equations 322-4 and 322-5 (provided in Attac
item IV-D-26) for spike concentration ratio.

Response: See response following comment 8.10.14.

14. The last sentence in section 10 should read "Acceptable recover
spiking are 70 to 130 percent."

Response to Comments 8.10.1 - 8.10.14: Since proposal of Method 322 for the measurement of HCl as part of the portland cement rule, the EPA attempted to utilize Method 322 to gather data from lime kilns (which have a matrix similar to portland cement sources) and encountered technical problems. Many of these problems were adequately identified by the data quality indicators in the method. However, as a backup option, the Agency collected data sets at lime kilns using both GFCIR and

FTIR. These paired data sets provide unexpected contradictory results.

The dynamic spiking results of the GFCIR would indicate that Method 322 results should be biased by overpredicting true value (spike recovery consistently showed greater than 100 percent recovery). However, FTIR data collected nearly simultaneously with the GFCIR data show the GFCIR results significantly lower than FTIR results. Since the Agency applied statistical methods to analyze the FTIR data and concluded that the FTIR method did not have a significant bias, the Agency is confident in the values reported by the FTIR instrument. Therefore, this leads us to a paradox with the GFCIR data; the results are contradictory for the GFCIR. At this point, the Agency has not determined the

cause of the paradox, which has led to the decision to postpone promulgation of Method 322 as an alternative method for measurement of HCl from portland cement kilns.

The EPA will continue to investigate the reasons for the differences in the two methods, and if a satisfactory solution is found to correct the problem, may consider further action on this method if additional evaluation data are available.

9. IMPLEMENTATION

9.1 Comment: One commenter (IV-D-27) is supportive of EPA's development (within the next two years) of an implementation guidance document. The document is needed to:

1. clarify notification requirements
2. clarify the issue of the deadline by which an affected facility can provide proof that it is an area source.

Since each cement facility's approach to complying with the rule will be different, it is critical that some guidance is provided to implementing agencies.

Response: The EPA will consider whether to provide an implementation guidance document or other separate implementation-related materials.

10. Reporting

10.1. Comment: One commenter (IV-D-21) would prefer that excess emissions reports be submitted on a quarterly rather than semi-annual basis as proposed. Virtually all other rules require such reports by calendar quarter and the consistency should be maintained. With semi-annual reports, a non-compliant situation can develop and it could take up to almost eight months before the appropriate agency is notified.

Response: The General Provisions provide for semi-annual excess emissions reports, with increased frequency following any report of excess emissions. The rule is consistent with the General Provisions to reduce reporting burden on sources and permitting agencies. Startup, shutdown, malfunction reports can be synchronized with semi-annual excess emissions reports.